# Industrial Protocols User's Guide

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# Industrial Protocols User's Guide

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# 1

# MODBUS/TCP MAP

## Introduction

MODBUS TCP is a protocol commonly used for the integration of a SCADA system. It is also a vendor-neutral communication protocol used to monitor and control industrial automation equipment such as PLCs, sensors, and meters. In order to be fully integrated into industrial systems, Moxa's switches support Modbus TCP/IP protocol for real-time monitoring in a SCADA system.

## Data Format and Function Code

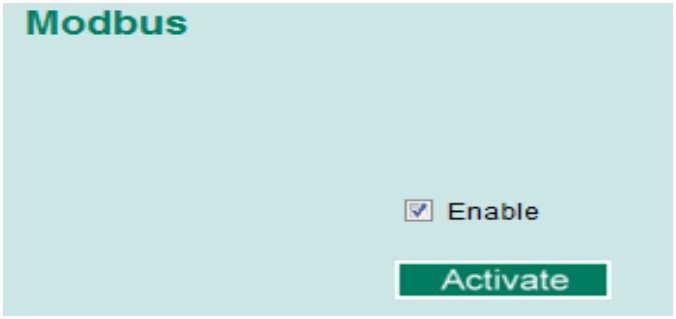
MODBUS TCP supports different types of data format for reading. The primary four types of them are:

| Data Access Type | | Function Code | Function Name | Note |
|---|---|---|---|---|
| Bit access | Physical Discrete Inputs | 2 | Read Discrete Inputs | |
| | Internal Bits or Physical Coils | 1 | Read Coils | |
| Word access (16-bit access) | Physical Input Registers | 4 | Read Input Registers | Moxa Support |
| | Physical Output Registers | 3 | Read Holding Registers | |

Moxa switches support **Function Code 4** with **16-bit (2-word)** data access for **read-only** information.

## Configuring MODBUS/TCP on Moxa Switches

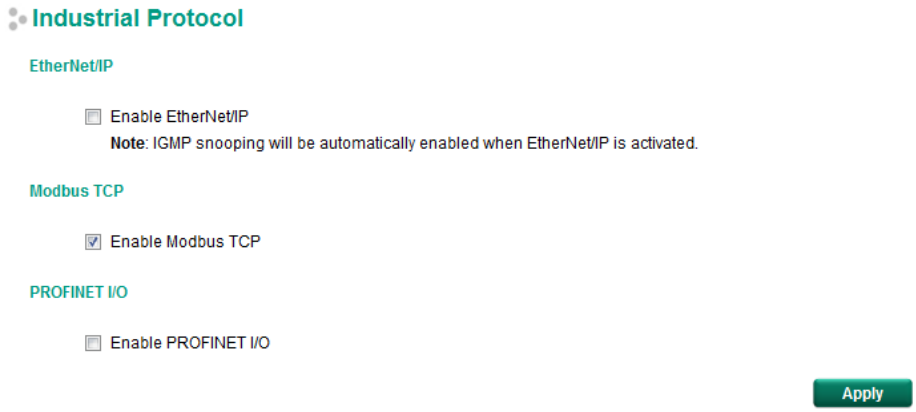
### Type 1




Select the checkbox and click **Activate** to enable the Modbus TCP.

### Type 2: New UI 2.0

Modbus TCP is enabled by default. To disable Modbus TCP, uncheck **Enable Modbus TCP** then click **Apply**.




# MODBUS Data Map and Information Interpretation of Moxa Switches

The data map addresses of Moxa switches shown in the following table start from **MODBUS address 30001** for Function Code 4. For example, the address offset 0x0000 (hex) equals MODBUS address 30001, and the address offset 0x0010 (hex) equals MODBUS address 30017. Note that all the information read from Moxa switches are in hex mode. To interpret the information, refer to the ASCII table for the translation (e.g. 0x4D = 'M', 0x6F = 'o').

| Address Offset | Data Type | Interpretation | Description |
|---|---|---|---|
| **System Information** | | | |
| 0x0000 | 1 word | HEX | Vendor ID = 0x1393 |
| 0x0001 | 1 word | | Unit ID (Ethernet = 1) |
| 0x0002 | 1 word | HEX | Product Code = 0x0003 |
| 0x0010 | 20 words | ASCII | Vendor Name = "Moxa"<br>Word 0 Hi byte = 'M'<br>Word 0 Lo byte = 'o'<br>Word 1 Hi byte = 'x'<br>Word 1 Lo byte = 'a'<br>Word 2 Hi byte = '\0'<br>Word 2 Lo byte = '\0' |
| 0x0030 | 20 words | ASCII | Product Name = "EDS-408A"<br>Word 0 Hi byte = 'E'<br>Word 0 Lo byte = 'D'<br>Word 1 Hi byte = 'S'<br>Word 1 Lo byte = '-'<br>Word 2 Hi byte = '4'<br>Word 2 Lo byte = '0'<br>Word 3 Hi byte = '8'<br>Word 3 Lo byte = 'A'<br>Word 4 Hi byte = '\0'<br>Word 4 Lo byte = '\0' |
| 0x0050 | 1 word | | Product Serial Number |
| 0x0051 | 2 words | | Firmware Version<br>Word 0 Hi byte = major (A)<br>Word 0 Lo byte = minor (B)<br>Word 1 Hi byte = release (C)<br>Word 1 Lo byte = build (D) |
| 0x0053 | 2 words | HEX | Firmware Release Date<br>For example:<br>Word 0 = 0 x 0609<br>Word 1 = 0 x 0705<br>Firmware was released on 2007-05-06 at 09 o'clock |
| 0x0055 | 3 words | HEX | Ethernet MAC Address<br>Ex: MAC = 00-01-02-03-04-05 |

| | | | |
|---|---|---|---|
| | | | Word 0 Hi byte = 0 x 00<br>Word 0 Lo byte = 0 x 01<br>Word 1 Hi byte = 0 x 02<br>Word 1 Lo byte = 0 x 03<br>Word 2 Hi byte = 0 x 04<br>Word 2 Lo byte = 0 x 05 |
| 0x0058 | 1 word | HEX | Power 1<br>0x0000: Off<br>0x0001: On |
| 0x0059 | 1 word | HEX | Power 2<br>0x0000: Off<br>0x0001: On |
| 0x005A | 1 word | HEX | Fault LED Status<br>0x0000: No<br>0x0001: Yes |
| 0x0080 | 1 word | HEX | DI1<br>0x0000:Off<br>0x0001:On |
| 0x0081 | 1 word | HEX | DI2<br>0x0000:Off<br>0x0001:On |
| 0x0082 | 1 word | HEX | DO1<br>0x0000:Off<br>0x0001:On |
| 0x0083 | 1 word | HEX | DO2<br>0x0000:Off<br>0x0001:On |
| **Port Information** | | | |
| 0x1000 to<br>0x1011 | 1 word | HEX | Port 1 to 8 Status<br>0x0000: Link down<br>0x0001: Link up<br>0x0002: Disable<br>0xFFFF: No port |
| 0x1100 to<br>0x1111 | 1 word | HEX | Port 1 to 8 Speed<br>0x0000: 10M-Half<br>0x0001: 10M-Full<br>0x0002: 100M-Half<br>0x0003: 100M-Full<br>0xFFFF: No port |
| 0x1200 to<br>0x1211 | 1 word | HEX | Port 1 to 8 Flow Ctrl<br>0x0000:Off<br>0x0001:On<br>0xFFFF:No port |
| 0x1300 to<br>0x1311 | 1 word | HEX | Port 1 to 8 MDI/MDIX<br>0x0000: MDI<br>0x0001: MDIX<br>0xFFFF: No port |
| 0x1400 to<br>0x1413 (Port 1)<br><br>0x1414 to<br>0x1427 (Port 2) | 20 words | ASCII | Port 1 to 8 Description<br>Port Description = "100TX,RJ45."<br>Word 0 Hi byte = '1'<br>Word 0 Lo byte = '0'<br>Word 1 Hi byte = '0'<br>Word 1 Lo byte = 'T'<br>…<br>Word 4 Hi byte = '4'<br>Word 4 Lo byte = '5'<br>Word 5 Hi byte = '.'<br>Word 5 Lo byte = '\0' |
| **Packets Information** | | | |
| 0x2000 to<br>0x2023 | 2 words | HEX | Port 1 to 8 Tx Packets<br>Ex: port 1 Tx Packet Amount = 44332211<br>Received MODBUS response:<br>0x44332211<br>Word 0 = 4433<br>Word 1 = 2211 |
| 0x2100 to<br>0x2123 | 2 words | HEX | Port 1 to 8 Rx Packets<br>Ex: port 1 Rx Packet Amount = 44332211<br>Received MODBUS response:<br>0x44332211<br>Word 0 = 4433<br>Word 1 = 2211 |
| 0x2200 to<br>0x2223 | 2 words | HEX | port 1 to 8 Tx Error Packets<br>Ex: port 1 Tx Error Packet Amount = 44332211 |

| | | | |
|---|---|---|---|
| | | | Received MODBUS response:<br>0x44332211<br>Word 0 = 4433<br>Word 1 = 2211 |
| 0x2300 to<br>0x2323 | 2 words | HEX | port 1 to 8 Rx Error Packets<br>Ex: port 1 Rx Error Packet Amount = 44332211<br>Received MODBUS response:<br>0x44332211<br>Word 0 = 4433<br>Word 1 = 2211 |
| **Redundancy Information** | | | |
| 0x3000 | 1 word | HEX | Redundancy Protocol<br>0x0000:None<br>0x0001:RSTP<br>0x0002:Turbo Ring<br>0x0003:Turbo Ring V2<br>0x0004:Turbo Chain<br>0x0005: MSTP |
| 0x3100 | 1 word | HEX | RSTP Root<br>0x0000: Not Root<br>0x0001: Root<br>0xFFFF: RSTP Not Enable |
| 0x3200 to<br>0x3211 | 1 word | HEX | RSTP Port 1 to 8 Status<br>0x0000: Port Disabled<br>0x0001: Not RSTP Port<br>0x0002: Link Down<br>0x0003: Blocked<br>0x0004: Learning<br>0x0005: Forwarding<br>0xFFFF: RSTP Not Enable |
| 0x3300 | 1 word | HEX | TurboRing Master/Slave<br>0x0000: Slave<br>0x0001: Master<br>0xFFFF: Turbo Ring Not Enable |
| 0x3301 | 1 word | HEX | TurboRing 1st Port status<br>0x0000: Port Disabled<br>0x0001: Not Redundant Port<br>0x0002: Link Down<br>0x0003: Blocked<br>0x0004: Learning<br>0x0005: Forwarding |
| 0x3302 | 1 word | HEX | TurboRing 2nd Port status<br>0x0000: Port Disabled<br>0x0001: Not Redundant Port<br>0x0002: Link Down<br>0x0003: Blocked<br>0x0004: Learning<br>0x0005:Forwarding |
| 0x3303 | 1 word | HEX | TurboRing Coupling<br>0x0000: Off<br>0x0001: On<br>0xFFFF: Turbo Ring is Not Enabled |
| 0x3304 | 1 word | HEX | TurboRing Coupling Port Status<br>0x0000: Port Disabled<br>0x0001: Not Coupling Port<br>0x0002: Link Down<br>0x0003: Blocked<br>0x0005: Forwarding<br>0xFFFF: Turbo Ring is Not Enabled |
| 0x3305 | 1 word | HEX | TurboRing Coupling Control Port Status<br>0x0000: Port Disabled<br>0x0001: Not Coupling Port<br>0x0002: Link Down<br>0x0003: Blocked<br>0x0005: Forwarding<br>0x0006: Inactive<br>0x0007:Active<br>0xFFFF:Turbo Ring is Not Enabled |
| 0x3500 | 1 word | HEX | TurboRing V2 Coupling Mode<br>0x0000: None<br>0x0001: Dual Homing<br>0x0002: Coupling Backup<br>0x0003: Coupling Primary<br>0xFFFF:Turbo Ring V2 is Not Enabled |

| | | | |
|---|---|---|---|
| 0x3501 | 1 word | HEX | TurboRing V2 Coupling Port Primary Status<br>(Used in Dual Homing, Coupling Backup, and Coupling Primary)<br>0x0000:Port Disabled<br>0x0001: Not Coupling Port<br>0x0002: Link Down<br>0x0003: Blocked<br>0x0004: Learning<br>0x0005: Forwarding<br>0xFFFF: Turbo Ring V2 is Not Enabled |
| 0x3502 | 1 word | HEX | TurboRing V2 Coupling Port Backup Status<br>(Only using in Dual Homing)<br>0x0000: Port Disabled<br>0x0001: Not Coupling Port<br>0x0002: Link Down<br>0x0003: Blocked<br>0x0004: Learning<br>0x0005: Forwarding<br>0xFFFF: Turbo Ring V2 Not Enable |
| 0x3600 | 1 word | HEX | TurboRing V2 Ring 1 status<br>0x0000: Healthy<br>0x0001: Break<br>0xFFFF:Turbo Ring V2 Not Enable |
| 0x3601 | 1 word | HEX | TurboRing V2 Ring 1 Master/Slave<br>0x0000: Slave<br>0x0001: Master<br>0xFFFF: Turbo Ring V2 Ring 1 Not Enable |
| 0x3602 | 1 word | HEX | TurboRing V2 Ring 1 1st Port Status<br>0x0000: Port Disabled<br>0x0001: Not Redundant Port<br>0x0002: Link Down<br>0x0003: Blocked<br>0x0004:Learning<br>0x0005:Forwarding<br>0xFFFF:Turbo Ring V2 Ring 1 is Not Enabled |
| 0x3603 | 1 word | HEX | TurboRing V2 Ring 1's 2nd Port Status<br>0x0000: Port Disabled<br>0x0001: Not Redundant Port<br>0x0002: Link Down<br>0x0003: Blocked<br>0x0004: Learning<br>0x0005: Forwarding<br>0xFFFF: Turbo Ring V2 Ring 1 is Not Enabled |
| 0x3680 | 1 word | HEX | TurboRing V2 Ring 2 Status<br>0x0000: Healthy<br>0x0001: Break<br>0xFFFF: Turbo Ring V2 Ring 2 is Not Enabled |
| 0x3681 | 1 word | HEX | TurboRing V2 Ring 2 Master/Slave<br>0x0000: Slave<br>0x0001: Master<br>0xFFFF: Turbo Ring V2 Ring 2 is Not Enabled |
| 0x3682 | 1 word | HEX | TurboRing V2 Ring 2's 1st Port Status<br>0x0000: Port Disabled<br>0x0001: Not Redundant<br>0x0002: Link Down<br>0x0003: Blocked<br>0x0004: Learning<br>0x0005: Forwarding<br>0xFFFF: Turbo Ring V2 Ring 2 is Not Enabled |
| 0x3683 | 1 word | HEX | TurboRing V2 Ring 2's 2nd Port Status<br>0x0000: Port Disabled<br>0x0001: Not Redundant<br>0x0002: Link Down<br>0x0003: Blocked<br>0x0004: Learning<br>0x0005: Forwarding<br>0xFFFF: Turbo Ring V2 Ring 2 is Not Enabled |
| 0x3700 | 1 word | HEX | Turbo Chain Switch Roles<br>0x0000: Head<br>0x0001: Member<br>0x0002: Tail<br>0xFFFF: Turbo Chain is Not Enabled |
| 0x3701 | 1 word | HEX | Turbo Chain 1st Port status |

| | | | |
|---|---|---|---|
| | | | 0x0000: Link Down<br>0x0001: Blocking<br>0x0002: Blocked<br>0x0003: Forwarding<br>0xFFFF: Turbo Ring V2 Ring 2 Not Enable |
| 0x3702 | 1 word | HEX | Turbo Chain 2nd Port status<br>0x0000: Link Down<br>0x0001: Blocking<br>0x0002: Blocked<br>0x0003: Forwarding<br>0xFFFF: Turbo Ring V2 Ring 2 Not Enable |
| **MSTP Register** | | | |
| 0x4000 ~ 0x407F | 1 word, 0x0103 => port role = DesignatedPort port state = Forwarding | HEX | MSTP CIST Port Role / Port State<br>0x00: DisabledPort / 0x00 Port Disabled<br>0x01: DesignatedPort / 0x01 Discarding<br>0x02: RootPort / 0x02 Learning<br>0x03: AlternatePort / 0x03 Forwarding<br>0x04: BackupPort<br>0x06: Not MSTP Port / 0x06Not MSTP Port<br>0xFFFF: MSTP Not Enable |
| 0x4080 ~ 0x40FF | 1 word, 0x0103 => port role = DesignatedPort port state = Forwarding | HEX | MSTP MSTI1 Port Role / Port State<br>0x00: DisabledPort / 0x00 Port Disabled<br>0x01: DesignatedPort / 0x01Discarding<br>0x02: RootPort / 0x02Learning<br>0x03: AlternatePort / 0x03Forwarding<br>0x04: BackupPort<br>0x05: MasterPort<br>0x06: Not MSTP Port / 0x06Not MSTP Port<br>0xFFFF: MSTP Not Enable |
| 0x4100 ~ 0x417F | 1 word, 0x0103 => port role = DesignatedPort port state = Forwarding | HEX | MSTP MSTI2 Port Role / Port State<br>0x00: DisabledPort / 0x00 Port Disabled<br>0x01: DesignatedPort / 0x01Discarding<br>0x02: RootPort / 0x02Learning<br>0x03: AlternatePort / 0x03Forwarding<br>0x04: BackupPort<br>0x05: MasterPort<br>0x06: Not MSTP Port / 0x06Not MSTP Port<br>0xFFFF: MSTP Not Enable |
| 0x4180 ~ 0x41FF | 1 word, 0x0103 => port role = DesignatedPort port state = Forwarding | HEX | MSTP MSTI3 Port Role / Port State<br>0x00: DisabledPort / 0x00 Port Disabled<br>0x01: DesignatedPort / x01Discarding<br>0x02: RootPort / 0x02Learning<br>0x03: AlternatePort / 0x03Forwarding<br>0x04: BackupPort<br>0x05: MasterPort<br>0x06: Not MSTP Port / 0x06Not MSTP Port<br>0xFFFF: MSTP Not Enable |
| 0x4200 ~ 0x427F | 1 word, 0x0103 => port role = DesignatedPort port state = Forwarding | HEX | MSTP MSTI4 Port Role / Port State<br>0x00: DisabledPort / 0x00 Port Disabled<br>0x01: DesignatedPort / 0x01Discarding<br>0x02: RootPort / 0x02Learning<br>0x03: AlternatePort / 0x03Forwarding<br>0x04: BackupPort<br>0x05: MasterPort<br>0x06: Not MSTP Port / 0x06Not MSTP Port<br>0xFFFF: MSTP Not Enable |
| 0x4280 ~ 0x42FF | 1 word, 0x0103 => port role = DesignatedPort port state = Forwarding | HEX | MSTP MSTI5 Port Role / Port State<br>0x00: DisabledPort / 0x00 Port Disabled<br>0x01: DesignatedPort / 0x01Discarding<br>0x02: RootPort / 0x02Learning<br>0x03: AlternatePort / 0x03Forwarding<br>0x04: BackupPort<br>0x05: MasterPort<br>0x06: Not MSTP Port / 0x06Not MSTP Port<br>0xFFFF: MSTP Not Enable |
| 0x4300 ~ 0x437F | 1 word, 0x0103 => port role = DesignatedPort port state = Forwarding | HEX | MSTP MSTI6 Port Role / Port State<br>0x00: DisabledPort / 0x00 Port Disabled<br>0x01: DesignatedPort / 0x01Discarding<br>0x02: RootPort / 0x02Learning<br>0x03: AlternatePort / 0x03Forwarding<br>0x04: BackupPort<br>0x05: MasterPort<br>0x06: Not MSTP Port / 0x06Not MSTP Port<br>0xFFFF: MSTP Not Enable |

| | | | |
|---|---|---|---|
| 0x4380 ~ 0x43FF | 1 word, 0x0103 => port role = DesignatedPort port state = Forwarding | HEX | MSTP MSTI7 Port Role / Port State<br>0x00: DisabledPort / 0x00 Port Disabled<br>0x01: DesignatedPort / 0x01Discarding<br>0x02: RootPort / 0x02Learning<br>0x03: AlternatePort / 0x03Forwarding<br>0x04: BackupPort<br>0x05: MasterPort<br>0x06: Not MSTP Port / 0x06Not MSTP Port<br>0xFFFF: MSTP Not Enable |

# 2

# EtherNet/IP

## Introduction

EtherNet/IP is an Industrial Ethernet Protocol defined by the ODVA association. The protocol is open to the public and vendors can implement EtherNet/IP into their industrial devices without incurring a license fee. Many vendors have adopted this protocol as the standard communication protocol between devices. For example, Rockwell Automation uses EtherNet/IP as the standard protocol for their Logix controllers over Ethernet networks.

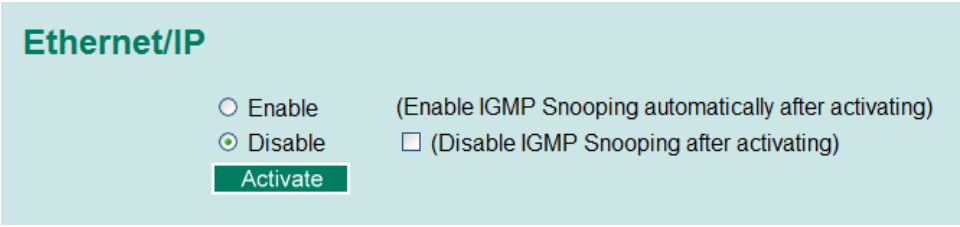
To allow complete integration with a Rockwell system, Moxa switches not only provide a full-functioning of industrial network infrastructure, but also enable the SCADA system to monitor the status of the switches as well as that of the PLCs, .making the switches part of a Rockwell system.

## Messaging Types

EtherNet/IP supports two types of communication methods for EtherNet/IP devices: Explicit Messaging and Implicit Messaging. Explicit Messaging is unscheduled and is used for a request/response communication procedure (or client/server procedure). Explicit Messaging uses TCP/IP over Ethernet. Implicit Messaging is scheduled and is used for a producer/consumer communication with UDP over Ethernet. Implicit Messaging is also called I/O Messaging.

## Configuring EtherNet/IP on Moxa Switches

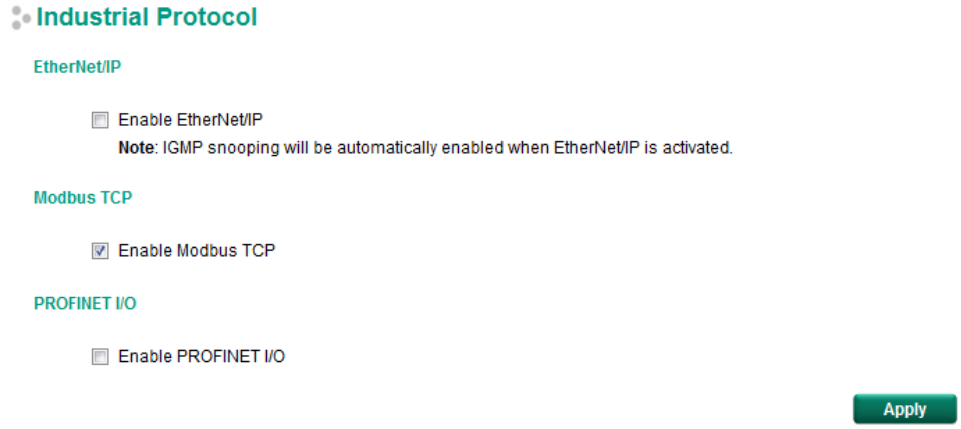
### Type 1:




Check the **Enable** checkbox to enable EtherNet/IP. With EtherNet/IP enabled, IGMP Snooping and IGMP Query functions will be enabled automatically to be properly integrated in Rockwell systems for multicast Implicit (I/O) Messaging.

### Type 2: New UI2.0

The default Modbus TCP support is enabled. To disable the Modebus TCP support, uncheck the **Enable Modbus TCP** then click **Apply** to activate the setting.




# CIP Objects of EtherNet/IP

Several communication objects are defined in CIP (Common Industrial Protocol). Moxa switches support the following objects for PLCs and SCADA systems to monitor:

- Identity Object
- TCP/IP Interface Object
- Ethernet Link Object
- Assembly Object
- Message Router Object
- Connection Manager Object
- Port Object
- Moxa Networking Object (Vendor Specific)

The supported attributes and services of the above objects are introduced in the table below, including the access rules for each attribute. To understand the details of each attribute of the standard objects, refer to the official documents of CIP introduction (Vol. 1) and the EtherNet/IP Adaptation of CIP (Vol. 2).

## Identity Object

The Class code of Identity object is **0x01** (Defined in CIP Vol1, 5-2).

There is **one** instance of this object in our product. It stores the information of the production and the device. The following tables summarize the class attributes and the instance attributes.

### Class Attribute List

| Attr ID | Access Rule | Name | Data Type | Description |
|---|---|---|---|---|
| 1 | Get | Revision | UINT (16) | Revision of this object |
| 2 | Get | Max Instance | UINT (16) | Maximum instance number of an object currently created in this class level of the device |
| 3 | Get | Number of Instances | UINT (16) | Number of object instances currently created in this class level of the device. |
| 6 | Get | Maximum ID Number Class Attributes | UINT (16) | The attribute ID number of the last class attribute of the class definition implemented in the device |
| 7 | Get | Maximum ID Number Instance Attributes | UINT (16) | The attribute ID number of the last instance attribute of the class definition implemented in the device |

### Instance Attribute List

| Attr ID | Access Rule | Name | (Struct.) | Data Type | Description |
|---|---|---|---|---|---|
| 1 | Get | Vendor ID | | UINT (16) | 991, the vendor ID of Moxa. |
| 2 | Get | Device Type | | UINT (16) | 0 x 307, "Managed Ethernet Switch". |
| 3 | Get | Product Code | | UINT (16) | Please refer to Product Code Table. |
| 4 | Get | Revision | | (Struct.) | The version of the Identity object |
| | | | Major | USINT (8) | The structure member, major |
| | | | Minor | USINT (8) | The structure member, minor. |
| 5 | Get | Status | | WORD (16) | Not used |
| 6 | Get | Serial Number | | UDINT (32) | The serial number of each device |
| 7 | Get | Product Name | | SHORT_ STRING | The product name in human-readable format |
| 15 | Get/Set | Assigned Name | | STRINGI | The assigned switch name<br>For example:<br>"Managed Redundant Switch xxxxx".<br>(xxxxx is series number.) |
| 17 | Get/Set | Geographic Location | | STRINGI | The assigned switch location<br>The default string is "Switch Location". |

The Identity Object Instance supports the following CIP Common services:

### Common Service List

| Service Code | Implementation | | Service Name | Description |
|---|---|---|---|---|
| | Class | Instance | | |
| 0x01 | ✓ | ✓ | Get_Attributes_All | Returns the contents of all attributes of the class |
| 0x0E | ✓ | ✓ | Get_Attribute_Single | Used to read an object instance attribute. |
| 0x10 | | ✓ | Set_Attribute_Single | Used to write an object instance attribute |
| 0x05 | | ✓ | Reset | Invokes the reset service for the device |

### Product Code Table

| Product Code | Model Name | Product Code | Model Name | Product Code | Model Name |
|---|---|---|---|---|---|
| 0x0001 | n/a | 0x0012 | EDS-G509 | 0x0023 | TN-5510-PoE |
| 0x0002 | n/a | 0x0013 | EDS-P510 | 0x0024 | TN-5508-PoE |
| 0x0003 | EDS-726 | 0x0014 | EDS-516A-MM-M12 | 0x0025 | n/a |
| 0x0004 | n/a | 0x0015 | IKS-6526SB | 0x0026 | IKS-6524 |
| 0x0005 | EDS-518A | 0x0016 | EDS-608 | 0x0027 | n/a |
| 0x0006 | EDS-405A | 0x0017 | IKS-6726-PoE | 0x0028 | n/a |
| 0x0007 | EDS-408A | 0x0018 | EDS-611 | 0x0029 | EDS-P506A |
| 0x0008 | EDS-505A | 0x0019 | EDS-616 | 0x002A | PT-7728-PTP |
| 0x0009 | EDS-508A | 0x001A | EDS-619 | 0x002B | PT-510 |
| 0x000A | EDS-510A | 0x001B | TN-5518 | 0x002C | PT-508 |
| 0x000B | EDS-516A | 0x001C | TN-5516 | 0x002D | n/a |
| 0x000C | EDS-728 | 0x001D | TN-5510 | 0x002E | n/a |
| 0x000D | PT-7728 | 0x001E | TN-5508 | 0x002F | IKS-G6524 |
| 0x000E | EDS-828 | 0x001F | EOM-104 | 0x0030 | ICS-G7526 |
| 0x000F | PT-7828 | 0x0020 | PT-G7509 | 0x0031 | ICS-G7528 |
| 0x0010 | PT-7710 | 0x0021 | TN-5518-PoE | 0x0032 | n/a |
| 0x0011 | IKS-6726 or PT7728S_old | 0x0022 | TN-5516-PoE | 0x0033 | IPS-P408 |
| 0x0034 | TN-5818 | 0x0045 | EDS-G508E | 0x0056 | n/a |
| 0x0035 | IKS-G6824 | 0x0046 | EDS-G512E | 0x0057 | RedBox |
| 0x0036 | ICS-G7826 | 0x0047 | EDS-G516E | 0x0058 | PT-7728-S-CN |
| 0x0037 | ICS-G7828 | 0x0048 | EDS-D102 | | |
| 0x0038 | ICS-G7748 | 0x0049 | TN-5816v2 | | |
| 0x0039 | ICS-G7750 | 0x004A | n/a | | |
| 0x003A | ICS-G7752 | 0x004B | n/a | | |
| 0x003B | ICS-G7848 | 0x004C | n/a | | |
| 0x003C | ICS-G7850 | 0x004D | n/a | | |
| 0x003D | ICS-G7852 | 0x004E | n/a | | |
| 0x003E | IKS-6852 | 0x004F | EDS-408A-SS-ST-BP | | |
| 0x003F | IKS-6728 | 0x0050 | EDS-510A-3SFP-2SSC | | |
| 0x0040 | PT-7528 | 0x0051 | n/a | | |
| 0x0041 | PT-7528-PTP | 0x0052 | IEX-402-VDSL | | |
| 0x0042 | TN-5510-2DSL | 0x0053 | IKS-6728-8PoE | | |
| 0x0043 | EDS-828-G52 | 0x0054 | EDS-510E | | |

# TCP/IP Interface Object

The Class code of TCP/IP Interface object is **0xf5** (Defined in CIP Vol2, 5-3).

There is **one** instance of this object.

The following tables summarize the attributes of this object.

### Class Attribute List

| Attr ID | Access Rule | Name | Data Type | Description |
|---|---|---|---|---|
| 1 | Get | Revision | UINT (16) | Revision of this object. |
| 2 | Get | Max Instance | UINT (16) | Maximum instance number of an object currently created in this class level of the device |
| 3 | Get | Number of Instances | UINT (16) | Number of object instances currently created at this class level of the device |
| 6 | Get | Maximum ID Number Class Attributes | UINT (16) | The attribute ID number of the last class attribute of the class definition implemented in the device |
| 7 | Get | Maximum ID Number Instance Attributes | UINT (16) | The attribute ID number of the last instance attribute of the class definition implemented in the device |

### Instance Attribute List

| Attr ID | Access Rule | Name | (Struct.) | Data Type | Description |
|---|---|---|---|---|---|
| 1 | Get | Status | | DWORD (32) | Interface status<br>0 = The Interface Configuration attribute has not been configured.<br>1 = The Interface Configuration attribute contains valid configuration obtained from BOOTP, DHCP or non-volatile storage. |
| 2 | Get | Configuration Capability | | DWORD (32) | Interface capability flags<br>Bit map of capability flags:<br>Bit 0: BOOTP Client<br>Bit 1: DNS Client<br>Bit 2: DHCP Client<br>Bit 3: DHCP-DNS Update<br>Bit 4: Configuration Settable |
| 3 | Get/Set | Configuration Control | | DWORD (32) | Interface control flags<br>Bit map of control flags:<br>Bit 0 to 3: Startup Configuration<br>0 = The device shall use the interface configuration values previously stored (for example, in non-volatile memory or via hardware witches).<br>1 = The device shall obtain its interface configuration values via BOOTP.<br>2 = The device shall obtain its interface configuration values via DHCP upon start-up.<br>3 to15 = Reserved. |
| 4 | Get | Physical Link Object | | (Struct.) | Path to physical link object |
| | | | Path Size | UINT (16) | Size of Path |
| | | | Path | Padded EPATH | Logical segments identifying the physical link object |
| 5 | Get/Set | Interface Configuration | | (Struct.) | TCP/IP network interface configuration |
| | | | IP Address | UDINT (32) | The device's IP address |
| | | | Network Mask | UDINT (32) | The device's network mask |
| | | | Gateway Address | UDINT (32) | Default gateway address |
| | | | Name Server | UDINT (32) | Primary name server |
| | | | Name Server2 | UDINT (32) | Secondary name server |
| | | | Domain Name | STRING | Default domain name |
| 6 | Get/Set | Host Name | | STRING | Host name |

The TCP/IP Object Instance supports the following CIP Common services:

### Common Service List

| Service Code | Implementation | | Service Name | Description |
|---|---|---|---|---|
| | Class | Instance | | |
| 0 x 01 | ✓ | ✓ | Get_Attributes_All | Returns the contents of all attributes of the class |
| 0 x 0E | ✓ | ✓ | Get_Attribute_Single | Used to read an object instance attribute |
| 0 x 10 | | ✓ | Set_Attribute_Single | Used to modify an object instance attribute |

# Ethernet Link Object

The Class code of Ethernet Link object is **0xf6** (Defined in CIP Vol2, 5-4). For each switch port, there is an instance of this class. The following table shows the mapping of instance number and the switch port number.

| Instance Number | Mapping to |
|---|---|
| 0 | Ethernet Link class |
| 1 | 1st switch port |
| 2 | 2nd switch port |
| 3 | 3rd switch port |
| … | … |

The following tables summarize the attributes of the Ethernet Link object.

There are some vendor specific attributes in the table (Starting from attribute Id 100).

## Class Attribute List

| Attr ID | Access Rule | Name | Data Type | Description |
|---|---|---|---|---|
| 1 | Get | Revision | UINT (16) | Revision of this object |
| 2 | Get | Max Instance | UINT (16) | Maximum instance number of an object currently created in this class level of the device |
| 3 | Get | Number of Instances | UINT (16) | Number of object instances currently created in this class level of the device |
| 6 | Get | Maximum ID Number Class Attributes | UINT (16) | The attribute ID number of the last class attribute of the class definition implemented in the device |
| 7 | Get | Maximum ID Number Instance Attributes | UINT (16) | The attribute ID number of the last instance attribute of the class definition implemented in the device |
| 100 | Get | Moxa-specific Revision | UINT (16) | Revision of Moxa specific attributes and services |

## Instance attribute list

| Attr ID | Access Rule | Name | (Struct.) | Data Type | Description |
|---|---|---|---|---|---|
| 1 | Get | Interface Speed | | UDINT (32) | Interface speed currently in use (Speed in Mbps, e.g., 0, 10, 100, 1000, etc.) |
| 2 | Get | Interface Flags | | DWORD (32) | Refer to the Interface Flags table. |
| 3 | Get | Physical Address | | ARRAY of 6 USINT(8) | MAC layer address (The System MAC address). |
| 4 | Get | Interface Counters | | (Struct.) | Counters relevant to the receipt of packets. |
| | | | In Octets | UDINT (32) | Octets received on the interface. |
| | | | In Ucast Packets | UDINT (32) | Unicast packets received on the interface. |
| | | | In NUcast Packets | UDINT (32) | Non-unicast packets received on the interface. |
| | | | In Discards | UDINT (32) | Inbound packets received on the interface but are discarded. |
| | | | In Errors | UDINT (32) | Inbound packets that contain Errors (does not include In Discards). |
| | | | Out Octets | UDINT (32) | Octets sent on the interface. |
| | | | Out Ucast Packets | UDINT (32) | Unicast packets sent on the interface. |
| | | | Out NUcast Packets | UDINT (32) | Non-unicast packets sent on the interface. |
| | | | Out Discards | UDINT (32) | Discarded outbound packets. |
| | | | Out Errors | UDINT (32) | Outbound packets that contain errors. |
| 5 | Get | Media Counters | | (Struct.) | |
| | | | Alignment Errors | UDINT (32) | Received frames that are not an integral number of octets in length. |
| | | | FCS Errors | UDINT (32) | Received frames that do not pass the FCS check. |
| | | | Single Collisions | UDINT (32) | Successfully transmitted frames which experienced exactly one collision. |
| | | | Multiple Collisions | UDINT (32) | Successfully transmitted frames which experienced more than one collision. |
| | | | SQE Test Errors | UDINT (32) | Number of times the SQE test error message is generated. |

| | | | | | |
|---|---|---|---|---|---|
| | | | Deferred Transmissions | UDINT (32) | Frames for which first transmission attempt is delayed because the medium is busy. |
| | | | Late Collisions | UDINT (32) | Number of times a collision is detected later than 512 bit times into the transmission of a packet. |
| | | | Excessive Collisions | UDINT (32) | Frames for which transmission fails due to excessive collisions. |
| | | | MAC Transmit Errors | UDINT (32) | Frames for which transmission fails due to an internal MAC sublayer transmit error. |
| | | | Carrier Sense Errors | UDINT (32) | Times that the carrier sense condition was lost or never asserted when attempting to transmit a frame. |
| | | | Frame Too Long | UDINT (32) | Received frames that exceed the maximum permitted frame size. |
| | | | MAC Receive Errors | UDINT (32) | Frames for which reception on an interface fails due to an internal MAC sublayer receive error. |
| 6 | Get/Set | Interface Control | | (Struct.) | Configuration for physical interface. |
| | | | Control Bits | WORD (16) | Bit 0: Auto-Negotiate<br>Value 0: Force<br>Value 1: Auto-Nego<br>Bit 1: Half/Full Duplex<br>Value 0: half duplex<br>Value 1: full duplex<br>Bit 2 to 15: Reserved, all zero |
| | | | Forced Interface Speed | UINT (16) | Speed at which the interface shall be forced to operate. |
| 10 | Get | Interface Label | | SHORT_STRING | Human readable identification |
| 100 | Get | Interface Port Index | | UDINT (32) | Port index. |
| 101 | Get | Interface Port Description | | STRING | Port description. |
| 102 | Get/Set | Broadcast Storm Protection | | USINT (8) | Value 0: Disabled Broadcast Storm Protection.<br>Value 1: Enable Broadcast Storm Protection.<br>(Only selected products support this function) |
| 103 | Get | Interface Utilization | | USINT (8) | RX interface utilization in percentage |
| 104 | Get/Set | Utilization Alarm Upper Threshold | | USINT (8) | RX interface utilization upper limit in percentage |
| 105 | Get/Set | Utilization Alarm Lower Threshold | | USINT (8) | Not supported |
| 106 | Get/Set | Port Link Alarm | | USINT (8) | Value 0: Ignore<br>Value 1: On (Relay 1)<br>Value 2: On (Relay 2)<br>Value 3: Off (Relay 1)<br>Value 4: Off (Relay 2) |
| 107 | Get/Set | Port Traffic-Overload Alarm | | USINT (8) | Value 0: Disable<br>Value 1: Enable(Relay 1)<br>Value 2: Enable(Relay 2) |
| 108 | Get | Tx Unicast Packet Rate | | UDINT(32) | Number of TX unicast packets per second |
| 109 | Get | Rx Unicast Packet Rate | | UDINT(32) | Number of RX unicast packets per second |
| 110 | Get | Tx Multicast Packet Rate | | UDINT(32) | Number of TX multicast packets per second |
| 111 | Get | Rx Multicast Packet Rate | | UDINT(32) | Number of RX multicast packets per second |
| 112 | Get | Tx Broadcast Packet Rate | | UDINT(32) | Number of TX broadcast packets per second |
| 113 | Get | Rx Broadcast Packet Rate | | UDINT(32) | Number of RX broadcast packets per second |

| | | | | | |
|---|---|---|---|---|---|
| 114 | Get | Tx Multicast Packet | | UDINT(32) | Total number of TX multicast packets |
| 115 | Get | Rx Multicast Packet | | UDINT(32) | Total number of RX multicast packets |
| 116 | Get | Tx Broadcast Packet | | UDINT(32) | Total number of TX broadcast packets |
| 117 | Get | Rx Broadcast Packet | | UDINT(32) | Total number of RX broadcast packets |
| 118 | Get | Redundant Port Status | | UDINT(32) | Bit 0 = Disable<br>Bit 1 = Not Redundant port<br>Bit 2 = Link down<br>Bit 3 = Blocking<br>Bit 4 = Learning<br>Bit 5 = Forwarding |

### Interface Flags

| Bit(s) | Called | Definition |
|---|---|---|
| 0 | Link Status | 0 indicates an inactive link;<br>1 indicates an active link. |
| 1 | Half/Full Duplex | 0 indicates half duplex;<br>1 indicates full duplex. |
| 2-4 | Negotiation Status | Indicates the status of link auto-negotiation<br>0 = Auto-negotiation in progress.<br>1 = Auto-negotiation and speed detection failed. Using default values for speed and duplex. Default values are product-dependent; recommended defaults are 10Mbps and half duplex.<br>2 = Auto negotiation failed but detected speed. Duplex was defaulted. Default value is product-dependent; recommended default is half duplex.<br>3 = Successfully negotiated speed and duplex.<br>4 = Auto-negotiation not attempted. Forced speed and duplex. |
| 5 | Manual Setting Requires Reset | 0 indicates the interface can activate changes to link parameters (auto-negotiate, duplex mode, interface speed) automatically. 1 indicates the device requires a Reset service be issued to its Identity Object in order for the changes to take effect. |
| 6 | Local Hardware Fault | 0 indicates the interface detects no local hardware fault; 1 indicates a local hardware fault is detected. The meaning of this is product-specific. For example, an AUI/MII interface might detect no transceiver attached, or a radio modem might detect no antenna attached. In contrast to the soft, possibly self-correcting nature of the Link Status being inactive, this is assumed a hard-fault requiring user intervention. |
| 7~31 | Reserved. | Shall be set to zero |

The Ethernet Link Object Instance supports the following CIP common services:

### Common Service List

| Service Code | Implementation | | Service Name | Description |
|---|---|---|---|---|
| | Class | Instance | | |
| 0x0E | ✓ | ✓ | Get_Attribute_Single | Used to read an object instance attribute |
| 0x10 | | ✓ | Set_Attribute_Single | Used to modify an object instance attribute |

# Assembly Object

The Moxa switch support **static** assembly object for CIP I/O messaging.

The Class code is **0x04** (Defined in CIP Vol 1, 5-5).

There are three instances of this object as the following.

| | Instance Number | Size (32 bit) |
|---|---|---|
| Input | 2 | 5 |
| Output | 1 | 2 |
| Configuration | 3 | 0 |

The **Input** means the data is produced by switch which includes the information and status report to the originator for monitoring. The **Output** means the data is generated by the originator (remote host) and is consumed by switch.

### Class Attribute List

| Attr ID | Access Rule | Name | Data Type | Description |
|---|---|---|---|---|
| 1 | Get | Revision | UINT (16) | Revision of this object |

### Instance Attribute List

| Attr ID | Access Rule | Name | (Struct.) | Data Type | Description |
|---|---|---|---|---|---|
| 3 | Get/Set | Data | | Array of BYTE | The implicit messaging content |
| 4 | Get | Size | | UINT (16) | Number of bytes in Attr. 3 |

### Common Service List

| Service Code | Implementation | | Service Name | Description |
|---|---|---|---|---|
| | Class | Instance | | |
| 0x0E | ✓ | ✓ | Get_Attribute_Single | Used to read an object instance attribute |
| 0x10 | | ✓ | Set_Attribute_Single | Used to modify an object instance attribute |

For the definition of the I/O messaging, see the following table for details.

### I/O Messaging Content

| Direction | I/O data | Size | Value & Description |
|---|---|---|---|
| Input | Switch Fault Status | UDINT (32) | Please refer to Moxa Networking Object Attr ID 2. |
| | Port Exist | ULINT (64) | Please refer to Moxa Networking Object Attr ID 4. |
| | Port Link Status | ULINT (64) | Please refer to Moxa Networking Object Attr ID 6. |
| Output | Port Enable | ULINT (64) | Please refer to Moxa Networking Object Attr ID 5. |

# Message Router Object

The object within a node that distributes messaging requests to the appropriate application objects.

The supported messaging connections are as the following:

- Explicit Messaging
- Unconnected Messaging
- Implicit messaging

When using the UCMM to establish an explicit messaging connection, the target application object is the Message Router object (Class Code **2**).

### Class Attribute List

| Attr ID | Access Rule | Name | Data Type | Descriptions |
|---|---|---|---|---|
| 1 | Get | Revision | UINT (16) | Revision of this object |

### Instance Attribute List

| Attr ID | Access Rule | Name | (Struct.) | Data Type | Description |
|---|---|---|---|---|---|
| 1 | Get | Object_list | | (Struct.) | A list of supported objects |
| | | | Number | UINT (16) | Number of supported classes in the classes array |
| | | | Classes | Array of UINT (16) | List of supported class codes |
| 2 | Get | Number Available | | UINT (16) | Maximum number of connections supported |
| 3 | Get | Number Active | | UINT (16) | Number of connections currently used by system components |
| 4 | Get | Active Connections | | Array of UINT (16) | A list of the connection IDs of the currently active connections |

### Common Service List

| Service Code | Implementation | | Service Name | Description |
|---|---|---|---|---|
| | Class | Instance | | |
| 0x0E | | ✓ | Get_Attribute_Single | Used to read an object instance attribute |

# Connection Manager Object

The Connection Manager Class allocates and manages the internal resources associated with both I/O and Explicit Messaging connections.

The class code is **0x06**. There is one instance of this object.

The supported connection trigger type is ***cyclic*** and ***change of state***.

The instance attribute list is introduced as the following.

### Class Attribute List

| Attr ID | Access Rule | Name | Data Type | Description |
|---|---|---|---|---|
| 1 | Get | Revision | UINT (16) | Revision of this object |

### Instance Attribute List

| Attr ID | Access Rule | Name | Data Type | Description |
|---|---|---|---|---|
| 1 | Get/Set | Open Requests | UINT(16) | Number of Forward Open service requests received |

### Common Service List

| Service Code | Implementation | | Service Name | Description |
|---|---|---|---|---|
| | Class | Instance | | |
| 0x0e | ✓ | ✓ | Get_Attribute_Single | Returns the contents of the specified attribute |
| 0x10 | | ✓ | Set_Attribute_Single | Used to modify an object instance attribute |
| 0x4E | | ✓ | Forward_Close | Closes a connection |
| 0x54 | | ✓ | Forward_Open | Opens a connection |

# Port Object

The port object represents the underlying interface of CIP which is EtherNet/IP.

The class code is **0xf4**. There is one instance of this object.

The instance attribute "**Port Type**" identifies the CIP adaptation.

### Class Attribute List

| Attr ID | Access Rule | Name | (Struct.) | Data Type | Description |
|---|---|---|---|---|---|
| 1 | Get | Revision | | UINT (16) | Revision of this object |
| 2 | Get | Max Instance | | UINT (16) | Maximum instance number of an object currently created in this class level of the device |
| 3 | Get | Number of Instances | | UINT (16) | Number of object instances currently created at this class level of the device. |
| 8 | Get | Entry Port | | UINT (16) | The attribute ID number of the last class attribute of the class definition implemented in the device |
| 9 | Get | Port Instance Info | | (Array of Struct.) | |
| | | | Port Type | UINT (16) | Enumerates the type of port |
| | | | Port Number | UINT (16) | CIP port number associated with this port |

### Instance Attribute List

| Attr ID | Access Rule | Name | (Struct.) | Data Type | Description |
|---|---|---|---|---|---|
| 1 | Get | Port Type | | UINT (16) | Enumerates the type of port.<br>4 = EtherNet/IP. |
| 2 | Get | Port Number | | UINT (16) | CIP port number associated with this port.<br>(Value 1 is reserved for internal product use) |
| 3 | Get | Link Object | | (Struct.) | |
| | | | Path Length | UINT (16) | Number of 16 bit words in the following path. |
| | | | Link Path | Padded EPATH | Logical path segments that identify the object for this port. |
| 4 | Get | Port Name | | SHORT_STRING | String which names the physical network port. The maximum number of characters in |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | the string is 64. |
| 5 | Get | Port Type Name | | SHORT_STRING | String which names the port type. The maximum number of characters in the string is 64. |
| 6 | Get/Set | Port Description | | SHORT_STRING | String which describes the port. The maximum number of characters in the string is 64. |
| 7 | Get | Node Address | | Padded EPATH | Node number of this device on port. The range within this data type is restricted to a Port Segment. |
| 9 | Get | Port Key | | Packed EPATH | Electronic key of network/chassis this port is attached to. This attribute shall be limited to format 4 of the Logical Electronic Key segment. |

### Common Service List

| Service Code | Implementation | | Service Name | Description |
|---|---|---|---|---|
| | Class | Instance | | |
| 0x0E | ✓ | ✓ | Get_Attribute_Single | Used to read an object instance attribute |
| 0x10 | | ✓ | Set_Attribute_Single | Used to modify an object instance attribute |

# Moxa Networking Object (Vendor Specific)

The Moxa Networking object includes system information and status.

It can also be used to do the device diagnostic & configuration through explicit messaging.

The class code is **0x404**.

### Class Attribute List

| Attr ID | Access Rule | Name | Data Type | Description |
|---|---|---|---|---|
| 1 | Get | Revision | UINT (16) | Revision of this object |

### Instance Attribute List

| Attr ID | Access Rule | Name | Data Type | Description |
|---|---|---|---|---|
| 1 | Get | Firmware Version | UDINT (32) | Switch firmware version |
| 2 | Get | System Fault Status | UDINT (32) | Switch fault status<br>Bit 0: Reserved<br>Value 0: Ok<br>Value 1: Fail<br>Bit 1: Reserved<br>Value 0: Ok<br>Value 1: Fail<br>Bit 2: Port utilization alarm<br>Value 0: No alarm<br>Value 1: alarm<br>Bit 3: Port link up<br>Value 0: No alarm<br>Value 1: Alarm<br>Bit 4: Port link down<br>Value 0: No alarm<br>Value 1: Alarm<br>Bit 5: Turbo ring break(Ring Master only)<br>Value 0: No alarm<br>Value 1: Alarm<br>Bit 6: Power Input 1 fail<br>Value 0: No alarm<br>Value 1: Alarm<br>Bit 7: Power Input 2 fail<br>Value 0: No alarm<br>Value 1: Alarm<br>Bit 8:DI 1(off)<br>Value 0: No alarm<br>Value 1: Alarm<br>Bit 9: DI 1(on)<br>Value 0: No alarm<br>Value 1: Alarm<br>Bit 10: DI 2(off)<br>Value 0: No alarm<br>Value 1: Alarm |

| | | | | |
|---|---|---|---|---|
| | | | | Bit 11: DI 2(on)<br>Value 0: No alarm<br>Value 1: Alarm<br>Bit 12: Reserved<br>Value 0: Not support<br>Value 1: Detected<br>Bit 13: Power supply 1<br>Value 0: Off<br>Value 1:On<br>Bit 14: Power supply 2<br>Value 0: Off<br>Value 1:On<br>Bit 15~31: Reserved. |
| 3 | Get | Switch Port Number | USINT (8) | Switch max port number |
| 4 | Get | Port Exist | ULINT (64) | switch per port exist<br>Bit mask, the LSB indicates the first port.<br>Value 0: Not exist<br>Value 1: Exist |
| 5 | Get/Set | Port Enable | ULINT (64) | Switch per port enable<br>Bit mask, the LSB indicates the first port.<br>Value 0: Enable<br>Value 1: Disable |
| 6 | Get | Port Link Status | ULINT (64) | Switch per port link status<br>Bit mask, the LSB indicates the first port.<br>Value 0: Link down<br>Value 1: Link up |
| 7 | Get/Set | IGMP Snooping Enable | USINT (8) | IGMP snooping enable:<br>Value 0: Disable<br>Value 1: Enable |
| 8 | Get/Set | Query Interval | UDINT (32) | Query interval range from 20 to 600 secs |
| 9 | Get/Set | IGMP Enhanced Mode | USINT (8) | IGMP enhanced mode<br>0: Disable(default)<br>1: Enable |
| 14 | Get/Set | Relay 1 | USINT (8) | Override relay warning setting<br>0: Disable(default)<br>1: Enable |
| 15 | Get/Set | Relay 2 | USINT (8) | Override relay warning setting<br>0: Disable (default)<br>1: Enable |
| 16 | Get/Set | Power 1 Relay Warning | USINT (8) | Power input 1 failure (on->off)<br>0: Disable (default)<br>1: Enable (relay 1)<br>2: Enable (relay 2) |
| 17 | Get/Set | Power 2 Relay Warning | USINT (8) | Power input 2 failure (on->off)<br>0: Disable (default)<br>1: Enable (relay 1)<br>2: Enable (relay 2) |
| 18 | Get/Set | DI 1 (0ff) Relay Warning | USINT (8) | DI 1 (0ff)<br>0: Disable (default)<br>1: Enable (relay 1)<br>2: Enable (relay 2) |
| 19 | Get/Set | DI 1 (on) Relay Warning | USINT (8) | DI 1 (0n)<br>0: Disable (default)<br>1: Enable (relay 1)<br>2: Enable (relay 2) |
| 20 | Get/Set | DI 2 (0ff) Relay Warning | USINT (8) | DI 2 (0ff)<br>0: Disable (default)<br>1: Enable (relay 1)<br>2: Enable (relay 2) |
| 21 | Get/Set | DI 2 (on) Relay Warning | USINT (8) | DI 2 (0n)<br>0: Disable (default)<br>1: Enable (relay 1)<br>2: Enable (relay 2) |
| 22 | Get/Set | Turbo Ring Break Relay Warning | USINT (8) | Turbo ring break (Ring Master only)<br>0: Disable (default)<br>1: Enable (relay 1)<br>2: Enable (relay 2) |
| 23 | Get | CPU Usage | USINT (8) | Percent of usage (0 to100) |
| 24 | Get | Device Up Time | UDINT (32) | Number of seconds since the device was powered up |
| 25 | Get/Set | Reset MIB Counts | USINT (8) | Reset port MIB counters. |
| 26 | Get | Redundant Device Mode | UDINT (32) | Bit mask of device roles.<br>Bits 0= RSTP |

| | | | | |
|---|---|---|---|---|
| | | | | Bits 1= Turbo Ring<br>Bits 2= Turbo Ring v2<br>Bits 3= Turbo Chain<br>Bits 4= MSTP |
| 27 | Get/Set | Reset Device | USINT (8) | Reboot and reset to default<br>1: Reboot the device<br>2: Reset to default |

**Common Service List**

| Service Code | Implementation | | Service Name | Description |
|---|---|---|---|---|
| | Class | Instance | | |
| 0x0E | ✓ | ✓ | Get_Attribute_Single | Used to read an object instance attribute |
| 0x10 | | ✓ | Set_Attribute_Single | Used to modify an object instance attribute |

# Electronic Data Sheet (EDS) File

The EDS (Electronic Data Sheet) file contains electronic descriptions of all relevant communication parameters and objects of an EtherNet/IP device. It is required for RSLogix 5000 to recognize Moxa switch and its CIP capability.

The list includes the sections which are described in our EDS file.

- [File]
- [Device]
- [Device Classification]
- [Port]

Icon should be 32 * 32 in pixel.

# Rockwell RSLogix 5000 Add-On Instructions (AOI)

The Rockwell RSLogix 5000 Add-On Instructions (AOI) encapsulates Moxa switch supported EtherNet/IP functions in a common interface logic component. In RSLogix 5000 programming, users could use the AOI to communicate with Moxa switches and need not know the internal logic.

Our AOI would provide logic of Moxa switch configuration and monitoring by using EtherNet/IP in explicit messaging and implicit messaging. The AOI also provides some tags for RSLogix 5000/SCADA programming.

## AOI Installation

To install the AOI, you must use Rockwell RSLogix 5000 version 18 or later and Moxa managed Ethernet switches with firmware version 3.0 or later.

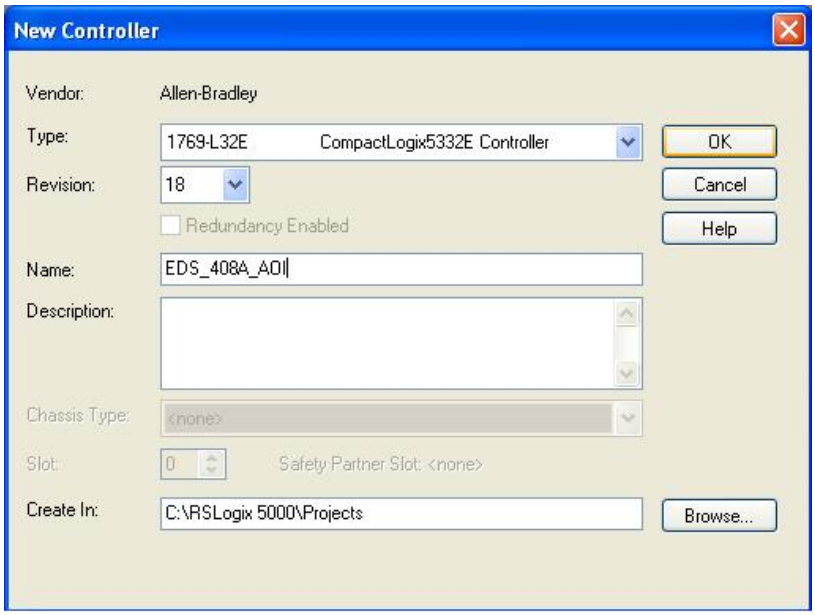
### The Five Major Stages of Installing the AOI

1. Add Moxa switch to the I/O configuration tree
2. Import the Add-On Instruction (AOI)
3. Add an instance of the AOI in your application
4. Create and configure tags for the AOI
5. Download the configured AOI to Rockwell PLC

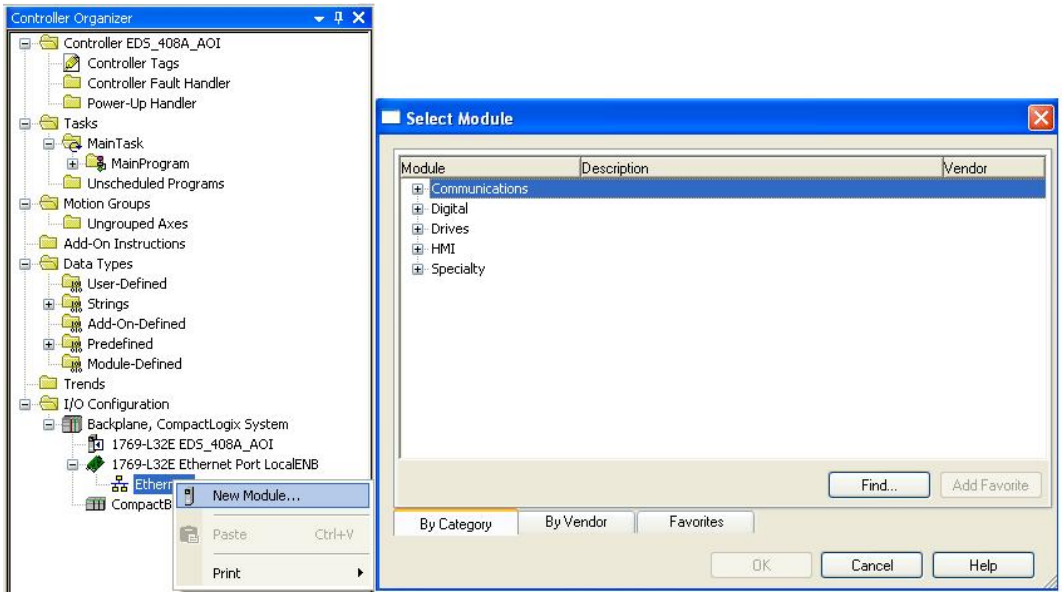
**Add Moxa switch to the I/O configuration tree**

In order to import the AOI, the first step is to create a new Ethernet Module in RSLogix 5000.

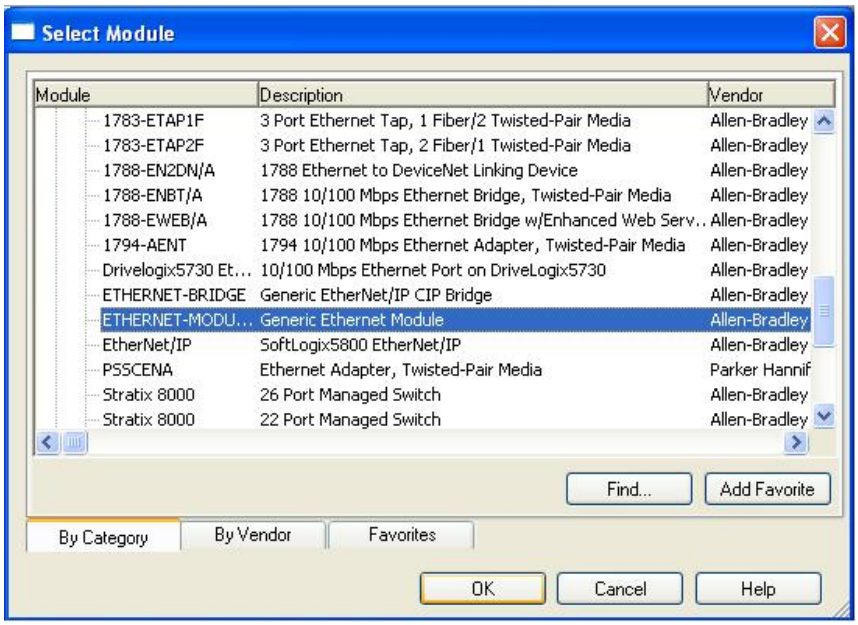
1. Open RSLogix 5000 and create a new controller.
   Click **Type** and select the Rockwell PLC model of the PLC connected to the Moxa switch. Input a **Name** and **Description** for this new controller.



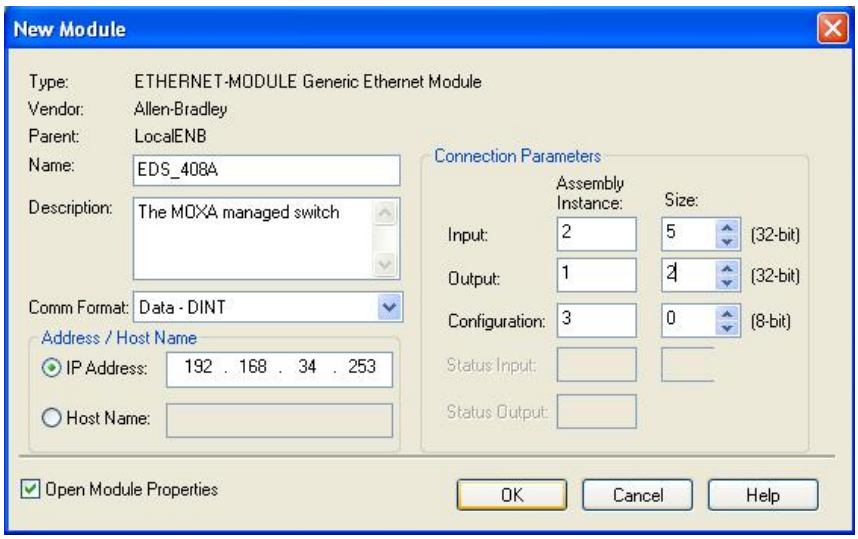

2. Add an Ethernet Module to the I/O Configuration.
   In the controller organizer window, select **I/O Configuration**, right click **Ethernet** under the PLC Ethernet port of the PLC connected to a Moxa switch, and select **New Module**.



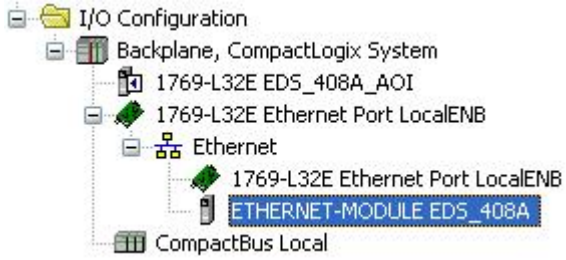
3. Under the **Communications** group, select **Generic Ethernet Module** to represent Moxa Ethernet switches




4. Configure the Ethernet module with the correct name, description, IP address and connection parameters and click OK.



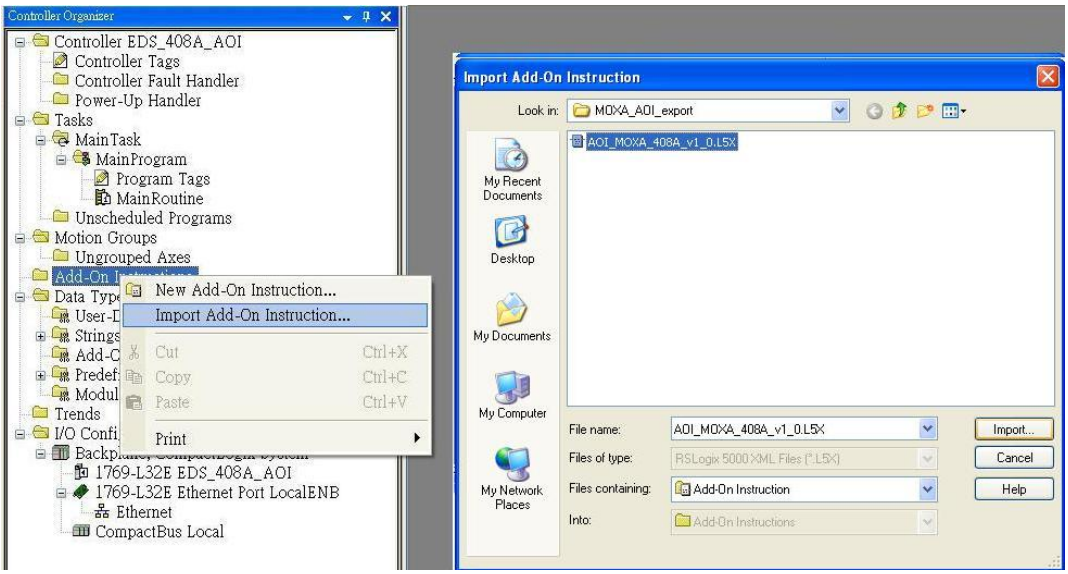

5. After finishing configuration, the new Ethernet module representing the Moxa Ethernet switch will appear under the **I/O Configuration** list in the controller organizer window.



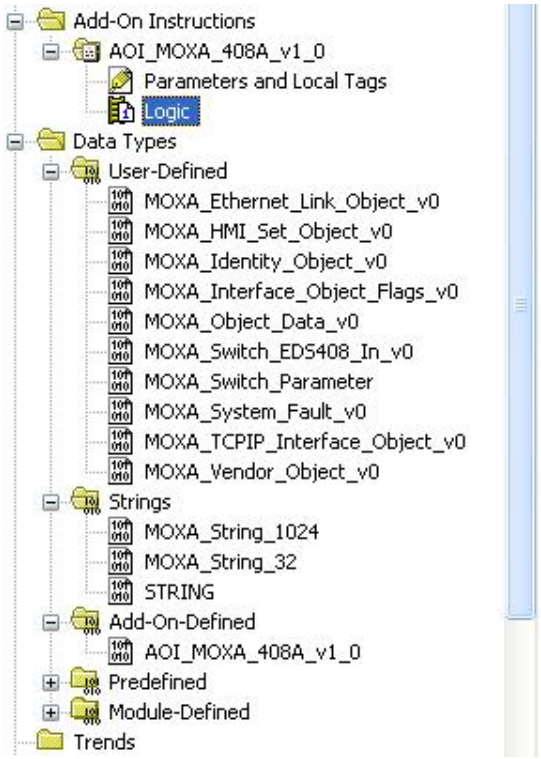
## Import the Add-On Instruction (AOI)

1. In the controller organizer window, right click the **Add-On Instructions** folder, select **Import Add-On Instructions** and select the correct AOI file (xxx.L5X) to import.

**NOTE** The AOI file is available from the Moxa website or in the software CD. Please make sure to use the latest switch firmware and AOI for programming.

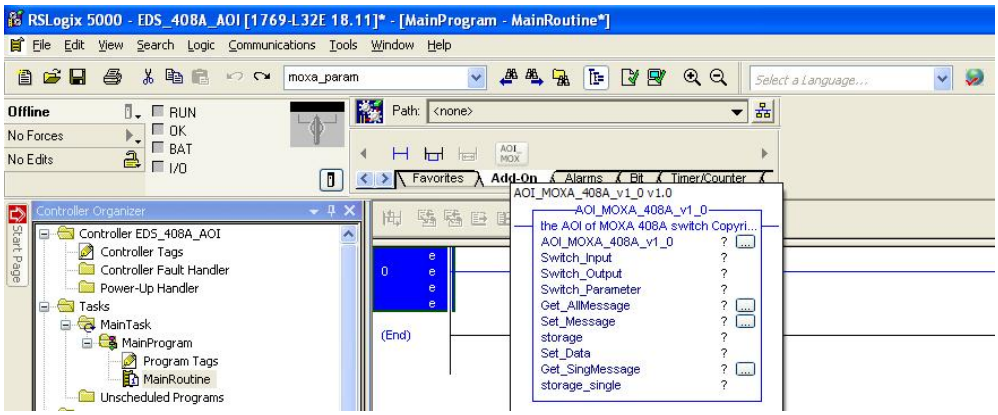



2. After importing, the controller organizer window shows all AOI for Moxa Ethernet switches under the **Add-On Instructions** folder.



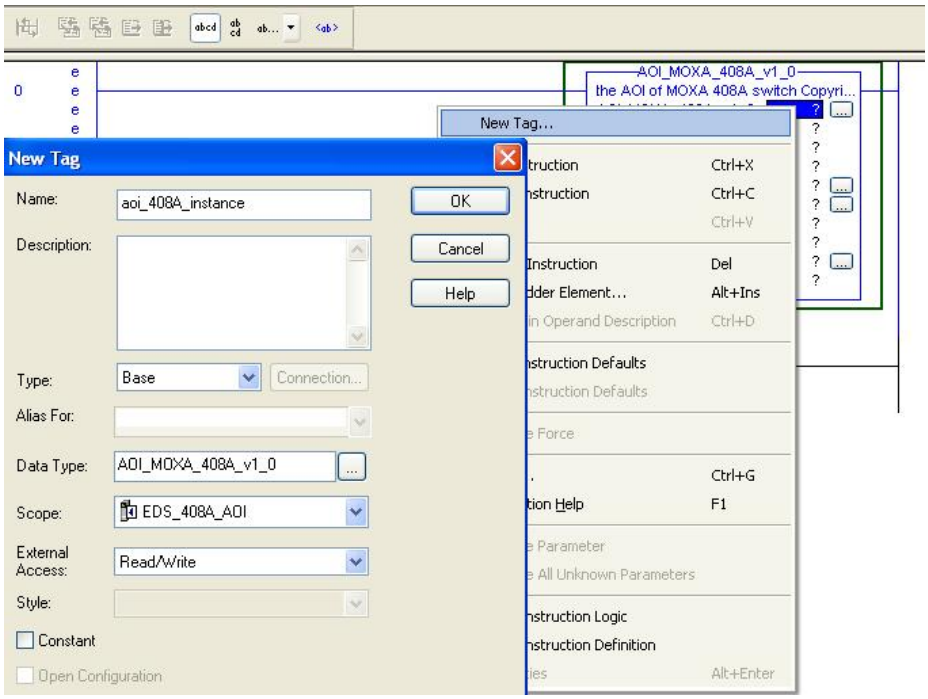
## Add an instance of the AOI in your application

1. Double click the **MainRoutine** in the Controller Organizer to start the ladder programming. Add the AOI for the specific Moxa Ethernet switch to create a new rung.

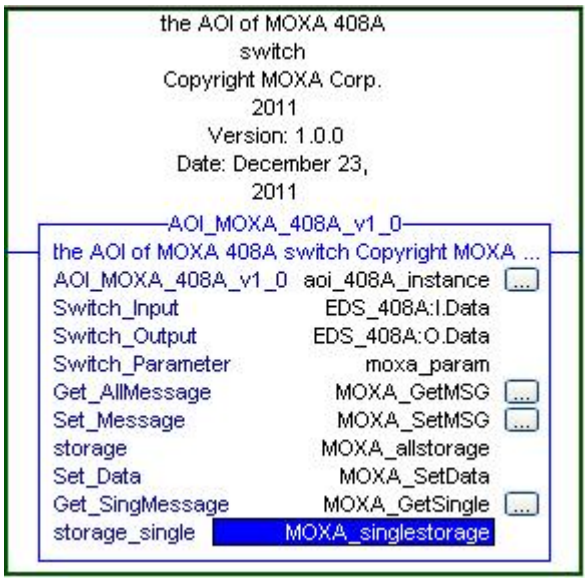



## Create and configure tags for the AOI

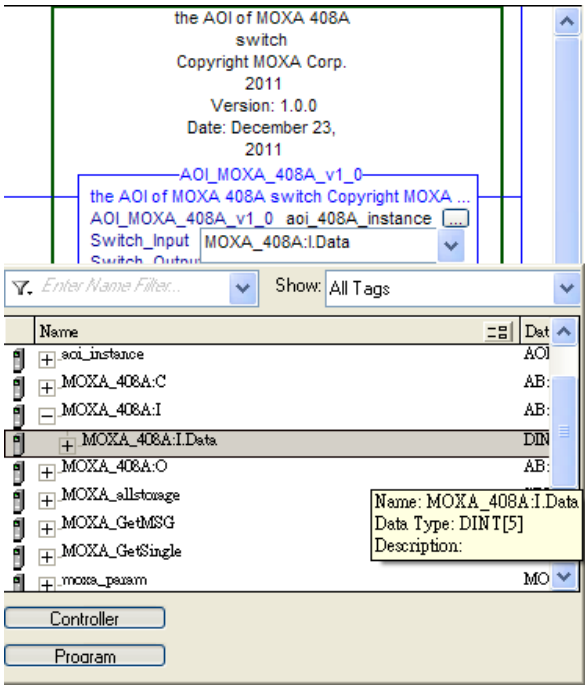
1. Right click on the **?** in the field of each tag, select **New Tag** and input a **Name** for each new tag.



2. Add a **Name** for all AOI tags.



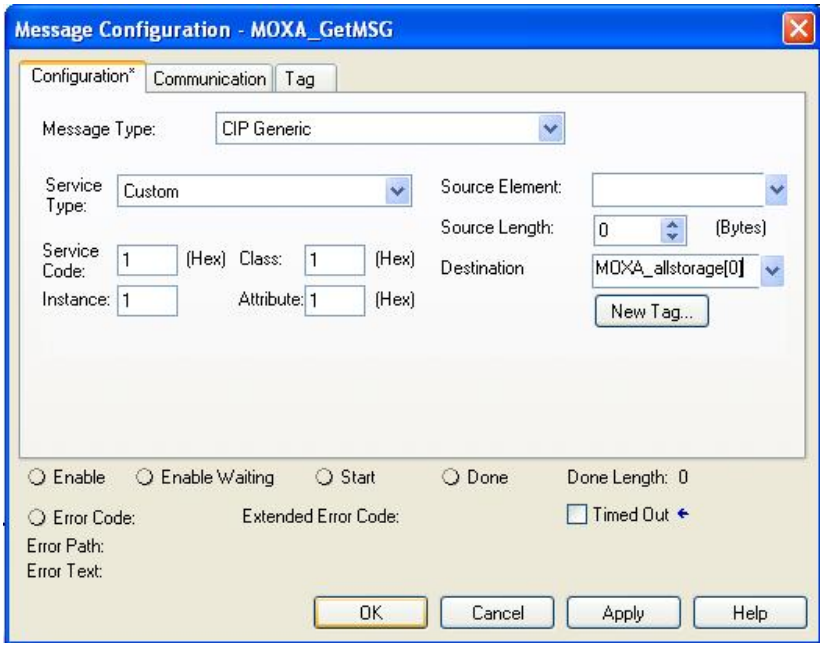

For "Switch_Input" and "Switch_Output", use the scrollbar to select the tag name



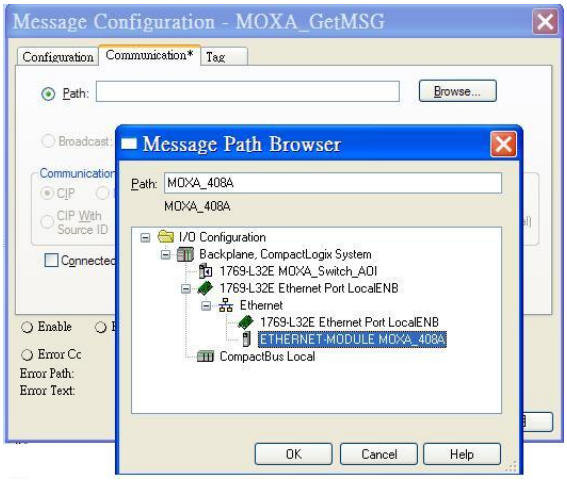

For all other tags, manually type the tag names:

| AOI Tag | Reference Tag Name |
|---|---|
| AOI_MOXA_408A_v1_0 | aoi_408A_instance |
| Switch_Input | MOXA_408A:I.Data |
| Switch_Output | MOXA_408A:O.Data |
| Switch_Parameter | moxa_param |
| Get_AllMessage | MOXA_GetMSG |
| Set_Message | MOXA_SetMSG |
| storage | MOXA_allstorage |
| Set_Data | MOXA_SetData |
| Get_SingMessage | MOXA_GetSingle |
| storage_single | MOXA_singlestorage |

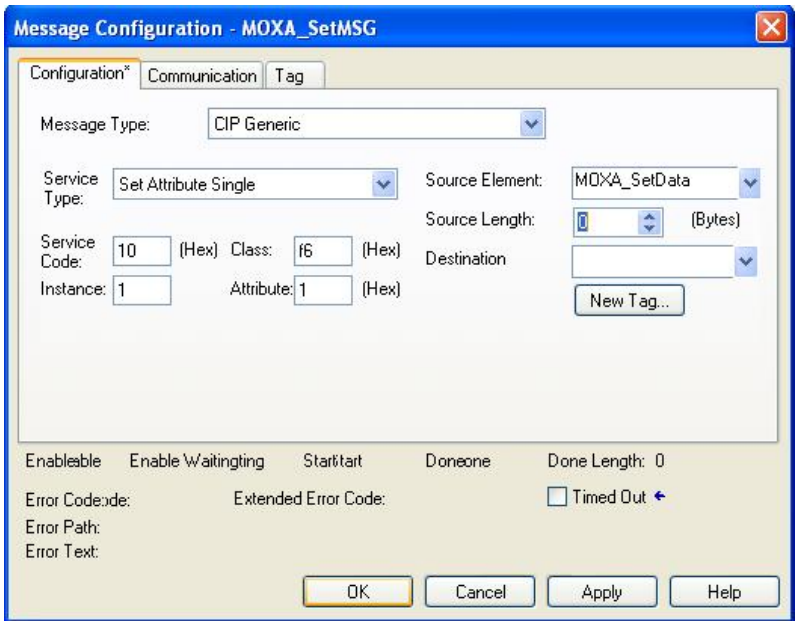
3. Click the square button to the right of the **Get_AllMessage** tag and configure all parameters as follows: (Service Code: 1; Class: 1; Instance: 1; Attribute: 1; Destination: MOXA_allstorage[0])



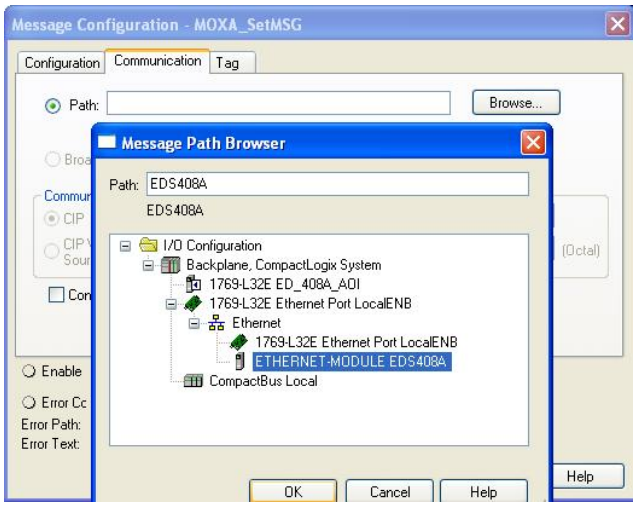

Click the **Communication** tab and set up the communication path to the Moxa Ethernet switch for **Get_AllMessage**



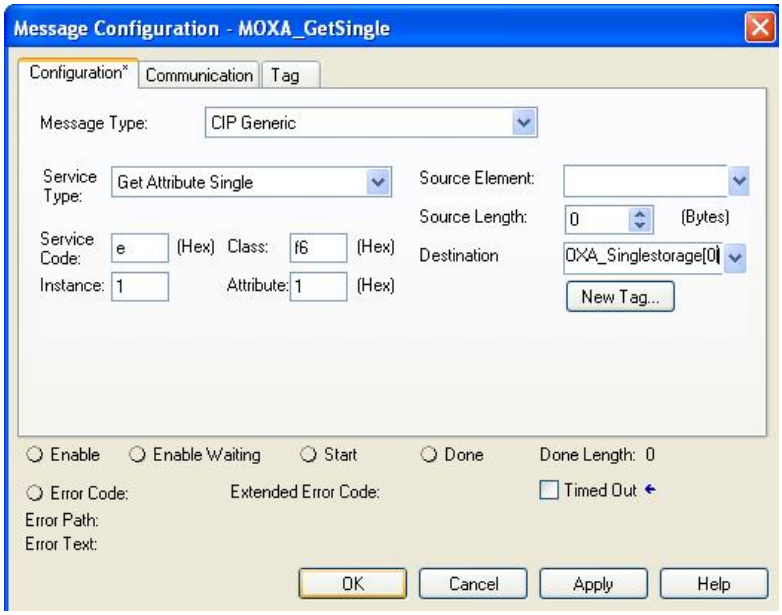

4. Click the square button to the right of the **Set_Message** tag and configure all parameters as follows: (Service Code: 10; Class: f6; Instance: 1; Attribute: 1; Source Ethernet: MOXA_SetData)



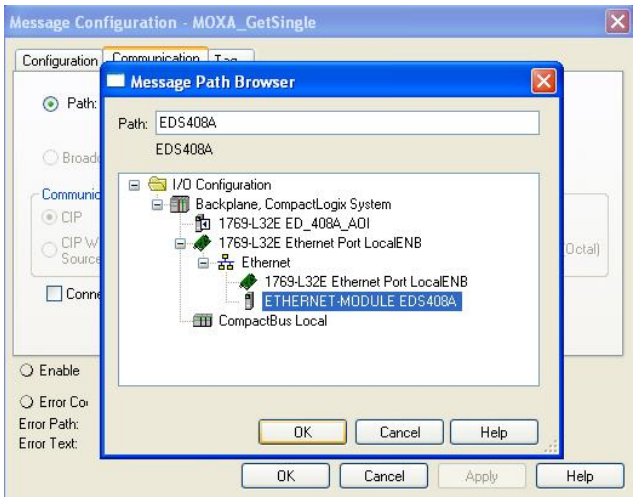
Click the **Communication** tab and set up the communication path to the Moxa Ethernet switch for **Set_Message**




5. Click the square button to the right of the **Get_SingMessage** tag and configure all parameters as follows:
(Service Code: e; Class: f6; Instance: 1; Attribute: 1; Destination: MOXA_Singlestorage[0])

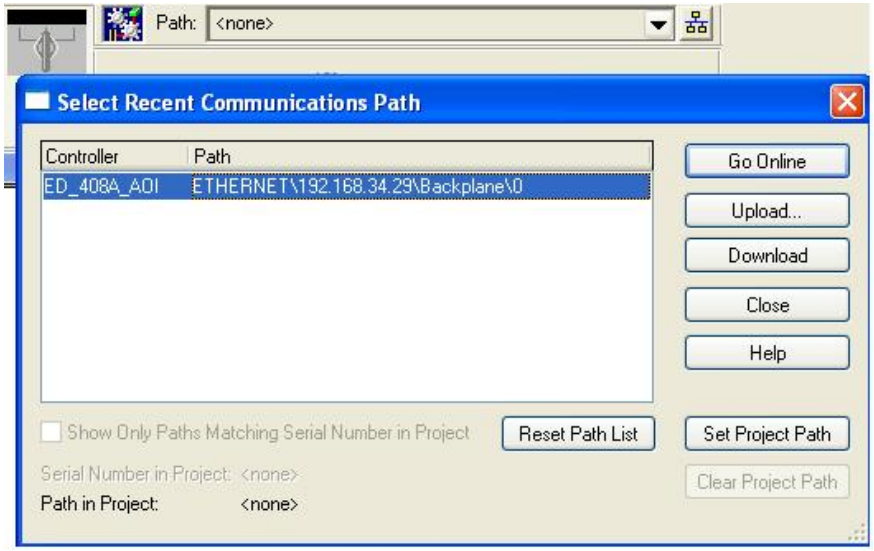



Click the **Communication** tab and set up the communication path to the Moxa Ethernet switch for **Get_SingMessage**

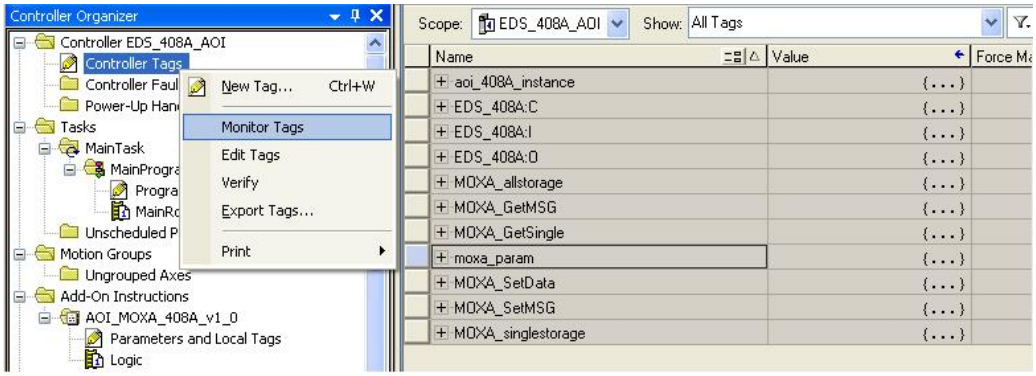


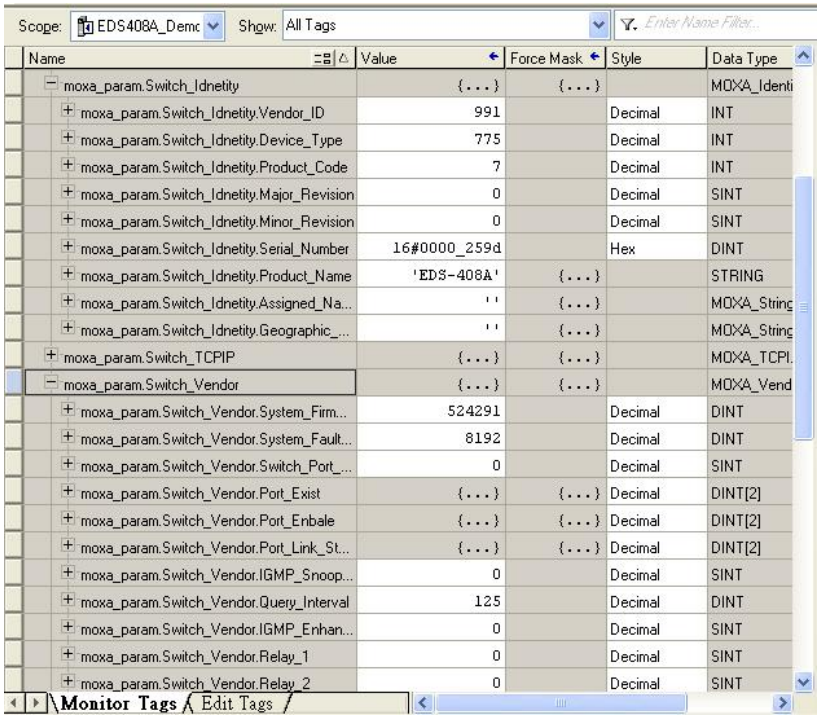
# Download the configured AOI to the Rockwell PLC

1. Click the **Network** Icon, select the Rockwell PLC connected to the Moxa switch and click **Download** to install the AOI configuration to the PLC.




2. After finishing configuration, go to the controller organizer window, right click **Controller Tags** and select **Monitor Tags** to check if each tag can display the correct value transferred from the Ethernet device.



**NOTE** Only Moxa pre-configured tags will display the correct values. Refer to the **CIP Tags** section below for detailed information.

## Sample AOI Project

For easier AOI installation, Moxa has also provided a sample AOI project, in which all the parameters are configured with default values. The sample project is a (.ACD) file, which is available for download from the Moxa website or software CD. You may import the sample project in RSLogix 5000, and directly download this AOI to the PLC with minimal installation steps. But to use the sample project, you still must change or set up the parameters below.

1. Change the controller type used in the real environment.
2. Change the controller and Moxa switch's IP address.
3. Setup the Project path.

**NOTE** The sample AOI project only supports RSLogix 5000 version 18.

# CIP Tags

There are tags for each CIP object. The tags correspond to the object's attributes.

## Tags for Identity Object

Data Type: MOXA_Identity_Object_v0

| Name | Data Type | Description |
|---|---|---|
| Vendor ID | INT | 991, MOXA Vendor ID |
| Device Type | INT | 0x307, "Managed Ethernet Switch" |
| Product Code | INT | EDS-405A=0x0006, EDS-408A=0x0007, EDS-505A=0x0008, EDS-508A=0x0009, EDS-510A=0x000A, EDS-516A=0x000B, EDS-G509=0x0012 |
| Major Revision | SINT | The structure member, major |
| Minor Revision | SINT | The structure member, minor |
| Serial Number | DINT | Switch serial number |
| Product Name | STRING | Switch model name |
| Assigned Name | STRING | User assigned switch name |
| Geographic Location | STRING | User assigned switch location |

## Tags for TCPIP Object

Data Type: MOXA_TCPIP_Interface_Object_v0

| Name | Data Type | Description |
|---|---|---|
| Status | DINT | Interface status |
| Configuration Capability | DINT | Interface capability flags |
| Configuration Control | DINT | Interface control flags |
| Path Size | INT | Size of Path |
| Object Path 1 | INT | Logical segments identifying the physical link object |
| Object Path 2 | INT | Logical segments identifying the physical link object |
| IP Address | DINT | The device's IP address |
| Network Mask | DINT | The device's network mask |
| Gateway Address | DINT | Default gateway address |
| Name Server 1 | DINT | Primary name server |
| Name Server 2 | DINT | Secondary name server |
| Domain Name | STRING | Default domain name |
| Host Name | STRING | Host name |

# Tags for Ethernet Link Object

| Name | Data Type | Description |
|---|---|---|
| Interface Speed | DINT | Interface speed currently in use. Speed in Mbps (e.g., 0, 10, 100, 1000, etc.) |
| Interface Flags | MOXA_Interface_Object_Flags_v0 | Interface status flags |
| Physical Address | SINT[6] | MAC layer address |
| InOctets | DINT | Octets received on the interface |
| InUcastPackets | DINT | Unicast packets received on the interface |
| InNucastPackets | DINT | Non-unicast packets received on the interface |
| InDiscards | DINT | Inbound packets received on the interface but discarded |
| InErrors | DINT | Inbound packets that contain errors (does not include In Discards) |
| OutOctets | DINT | Octets sent on the interface |
| OutUcastPackets | DINT | Unicast packets sent on the interface |
| OutNucastPackets | DINT | Non-unicast packets sent on the interface |
| OutDiscards | DINT | Outbound packets discarded |
| OutErrors | DINT | Outbound packets that contain errors |
| Alignment Errors | DINT | Frames received that are not an integral number of octets in length |
| FCS Errors | DINT | Frames received that do not pass the FCS check |
| Single Collisions | DINT | Successfully transmitted frames which experienced exactly one collision |
| Multiple Collisions | DINT | Successfully transmitted frames which experienced more than one collision |
| SQE Test Errors | DINT | Number of times SQE test error message is generated |
| Deferred Transmissions | DINT | Frames for which first transmission attempt is delayed because the medium is busy |
| Late Collisions | DINT | Number of times a collision is detected later than 512 bit-times into the transmission of a packet |
| Excessive Collisions | DINT | Frames for which transmission fails due to excessive collisions |
| MAC Transmit Errors | DINT | Frames for which transmission fails due to an internal MAC sublayer transmit error |
| Carrier Sense Errors | DINT | Times that the carrier sense condition was lost or never asserted when attempting to transmit a frame |
| Frame Too Long | DINT | Frames received that exceed the maximum permitted frame size |
| MAC Receive Errors | DINT | Frames for which reception on an interface fails due to an internal MAC sublayer receive error |
| Control Bits | INT | 0 Auto-negotiate 0 indicates 802.3 link auto-negotiation is disabled. 1 indicates auto-negotiation is enabled |
| Forced Interface Speed | INT | Speed at which the interface shall be forced to operate. Speed in Mbps (10, 100, 1000, etc.) |
| Interface Label | STRING | Label like "TX5" |
| Interface Port Index | DINT | Port index |
| Interface Port Description | STRING | Port description |
| Broadcast Storm Protection | SINT | Only on MOXA IKS, PT, EDS-516A/518A, and EDS-728/828 series |
| Interface Utilization | SINT | Percentage of entire interface bandwidth being used (0-100) |
| Utilization Alarm Upper Threshold | SINT | Upper percentage at which to declare an utilization alarm (0-100) |
| Utilization Alarm Lower Threshold | SINT | Lower percentage at which to declare an utilization alarm (0-100) |
| Port Link Alarm | SINT | 0: Ignore,<br>1: On (Relay 1),<br>2: On (Relay 2),<br>3: Off (Relay1),<br>4: Off (Relay2) |
| Port TrafficOverload Alarm | SINT | 0: Disable,<br>1: Enable(Relay 1),<br>2: Enable(Relay 2) |
| Tx Unicast Packet Rate | DINT | Number of TX unicast packets per second |
| Rx Unicast Packet Rate | DINT | Number of RX unicast packets per second |
| Tx Multicast Packet Rate | DINT | Number of TX multicast packets per second |
| Rx Multicast Packet Rate | DINT | Number of RX multicast packets per second |
| Tx Broadcast Packet Rate | DINT | Number of TX broadcast packets per second |
| Rx Broadcast Packet | DINT | Number of RX broadcast packets per second |

| | | |
|---|---|---|
| Rate | | |
| Tx Multicast Packet | DINT | Total number of TX multicast packets |
| Rx Multicast Packet | DINT | Total number of RX multicast packets |
| Tx Broadcast Packet | DINT | Total number of TX multicast packets |
| Rx Broadcast Packet | DINT | Total number of RX broadcast packets |
| Redundant Port Status | DINT | Bit 0 = Disable,<br>Bit 1 = Not Redundant port,<br>Bit 2 = Link down,<br>Bit 3 = Blocking,<br>Bit 4 = Learning,<br>Bit 5 = Forwarding |

## Tags for Moxa Networking Object

Data Type: MOXA_Vendor_Object_v0

| Name | Data Type | Description |
|---|---|---|
| System Firmware Version | DINT | Switch firmware version |
| System Fault Status | DINT | Switch fault status |
| Switch Port Number | SINT | Switch max port number |
| Port Exist | DINT[2] | Switch per port exist |
| Port Enable | DINT[2] | Switch per port exist<br>0:Enable<br>1:Disable |
| Port Link Status | DINT[2] | Switch per port link status |
| IGMP Snooping | SINT | IGMP snooping enable:<br>0: Disable<br>1: Enable |
| Query Interval | DINT | Query Interval range from 20~600 sec |
| IGMP Enhanced Mode | SINT | IGMP enhanced mode<br>0: Disable (default)<br>1: Enable |
| Relay 1 | SINT | Override relay warning setting<br>0: Disable (default)<br>1: Enable |
| Relay 2 | SINT | Override relay warning setting<br>0: Disable (default)<br>1: Enable |
| Power 1 Relay Warning | SINT | Power input 1 failure (on → off)<br>0: Disable (default)<br>1: Enable(relay 1)<br>2: Enable(relay 2) |
| Power 2 Relay Warning | SINT | Power input 2 failure (on → off)<br>0: Disable (default)<br>1: Enable(relay 1)<br>2: Enable(relay 2) |
| DI 1 Off Relay Warning | SINT | DI 1 (off)<br>0: disable (default)<br>1: Enable(relay 1)<br>2: Enable(relay 2) |
| DI 1 On Relay Warning | SINT | DI 1 (on)<br>0: Disable (default)<br>1: Enable(relay 1)<br>2: Enable(relay 2) |
| DI 2 Off Relay Warning | SINT | DI 2 (off)<br>0: Disable (default)<br>1: Enable(relay 1)<br>2: Enable(relay 2) |
| DI 2 On Relay Warning | SINT | DI 2 (on)<br>0: Disable (default)<br>1: Enable(relay 1)<br>2: Enable(relay 2) |
| Turbo Ring Break Relay Warning | SINT | Turbo Ring Break (Ring Master Only )<br>0: Disable (default)<br>1: Enable (relay 1)<br>2: Enable (relay 2) |
| CPU Usage | SINT | Percent of usage (0-100) |
| Device Up Time | DINT | Number of seconds since device was powered up |
| Reset Mib Counter | SINT | Reset port MIB counters |
| Redundant Device Mode | DINT | Bit 0: RSTP, |

| | | |
|---|---|---|
| | | Bit 1: Turbo Ring,<br>Bit 2: Turbo Rong v2,<br>Bit 3: Turbo Chain,<br>Bit 4: MSTP |
| Reset Device | SINT | 1: restart the device<br>2: reset to default |

## Pre-configured Tags in the Moxa AOI

The Moxa AOI supports all the CIP tags listed in the tables above. But in the AOI, we only pre-configure logic links between selected tags and Moxa switches. To monitor the non-configured tags, PLC programmers need to create the links manually. Otherwise, in RSLogix 5000, the value column of these tags will display as "0". If you experience problems creating new links, please contact Moxa technical support for assistance.

**NOTE** For pre-configured tags, Moxa has already created the logic links between the CIP tags and Moxa Ethernet switches so RSLogix 5000 can get/set the switch information correctly.

The table below specifies all the pre-configured tags in Moxa AOI with a ※ mark.

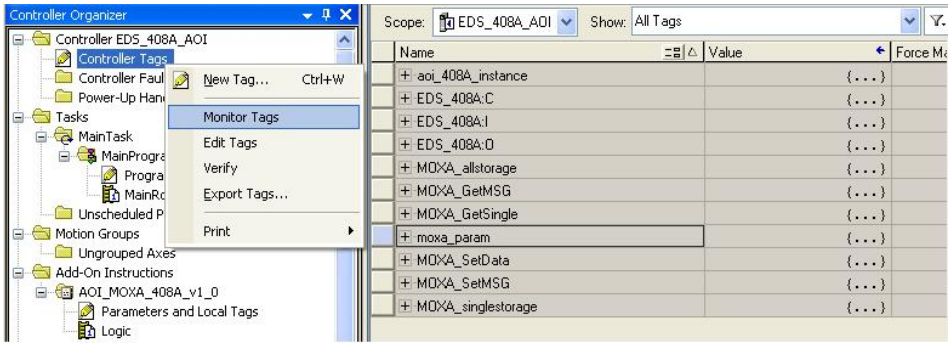
| **Pre-Configured Tags** | **Name** |
|---|---|
| Identity Object (0x01) | |
| ※ | Vendor ID |
| ※ | Device Type |
| ※ | Product Code |
| | Revision |
| | Status |
| ※ | Serial Number |
| ※ | Product Name |
| | Assigned Name |
| | Geographic Location |
| TCP/IP Interface Object (0xf5) | |
| | Status |
| | Configuration Capability |
| | Configuration Control |
| | Physical Link Object |
| | Interface Configuration |
| ※ | IP Address |
| ※ | Network Mask |
| | Gateway Address |
| | Name Server |
| | Name Server 2 |
| | Domain Name |
| ※ | Host Name |
| Ethernet Link Object (0xf6)- by port | |
| ※ | Interface Speed |
| ※ | Interface Flags |
| | Link Status |
| | Half/Full Duplex |
| | Negotiation Status |
| | Manual Setting Requires Reset |
| | Local Hardware Fault |
| ※ | Physical Address |
| | Interface Counters |
| | In Octets |
| | In Ucast Packets |
| | In Nucast Packets |
| | In Discards |
| ※ | In Errors |
| | Out Octets |
| | Out Ucast Packets |
| | Out Nucast Packets |
| | Out Discards |
| ※ | Out Errors |
| | Media Counters |
| | Interface Control |

| | |
|---|---|
| ※ | Control Bits |
| ※ | Forced interface Speed |
| | Interface Lable |
| | Interface Description |
| | Interface Port Description |
| | Broadcast Storm Protection |
| ※ | Interface Utizatiion |
| | Utilization Alarm Upper Threshold |
| | Utilization Alarm Lower Threshold |
| | Port Link Alarm |
| | Port Traffic-Overload Alarm |
| ※ | Tx Unicast Packet Rate |
| ※ | Rx Unicast Packet Rate |
| ※ | Tx Multicast Packet Rate |
| ※ | Rx Multicast Packet Rate |
| ※ | Tx Broadcast Packet Rate |
| ※ | Rx Broadcast Packet Rate |
| | Tx Multicast Packet |
| | Rx Multicast Packet |
| | Tx Broadcast Packet |
| | Rx Broadcast Packet |
| ※ | Redundant port status |
| Port Object (0xf4) | |
| | Port Type |
| | Port Number |
| | Link Object |
| | Port Name |
| | Port Type Name |
| | Port Description |
| | Node Address |
| | Port Key |
| MOXA Networking Object (0x404) | |
| ※ | Firmware Version |
| ※ | System Fault Status |
| | Switch Port Number |
| ※ | Port Exist |
| ※ | Port Enable |
| ※ | Port Link Status |
| | IGMP Snooping Enable |
| ※ | Query Interval |
| ※ | IGMP Enhanced Mode |
| | Relay1 |
| | Relay2 |
| | Power 1 relay waring |
| | Power 2 relay waring |
| | DI 1(off) relay warning |
| | DI 1(on) relay warning |
| | DI 2(off) relay warngin |
| | DI 2(on) relay warngin |
| | Turbo Ring Break relay warning |
| ※ | CPU usage |
| | Device Up Time |
| ※ | Reset MIB Counts |
| ※ | Redundant device mode |
| | reset device |
| I/O message Object | |
| ※ | Switch Fault Status |
| ※ | Port Exist |
| ※ | Port Link Status |
| ※ | Port Enable |

# Monitoring AOI Tags

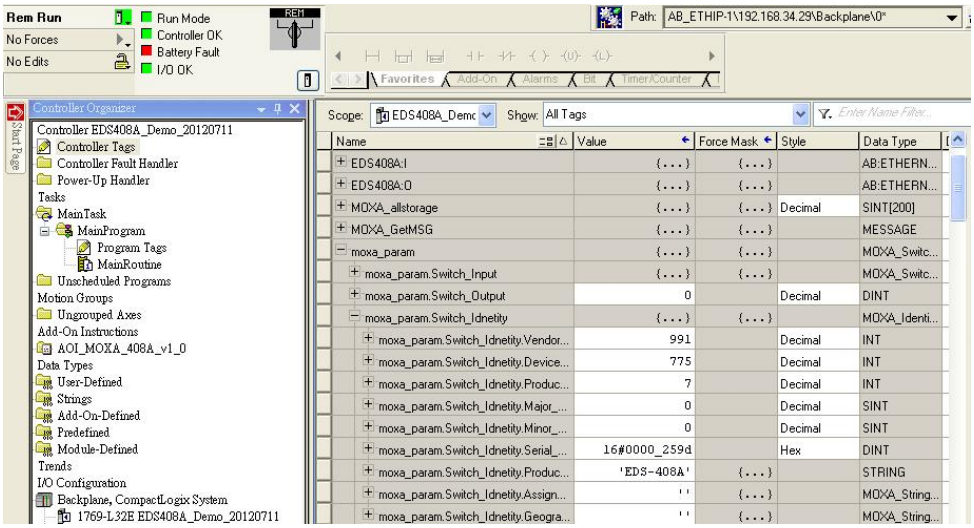
In RSLogix 5000, you can monitor the values of all configured tags by selecting “Monitor Tags” in the controller organizer window. It can also be used to check that the AOI is installed correctly

**NOTE** Only Moxa pre-configured tags will display the correct values. Refer to the **CIP Tags** section above for detailed information.



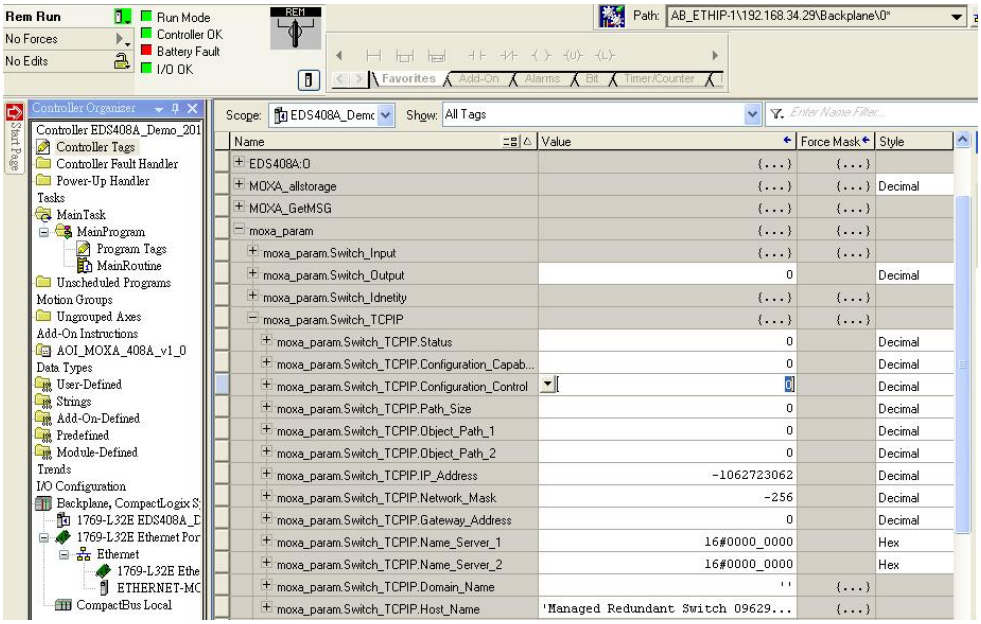

## Monitor Tags for Identity Object

Click **moxa_param Switch_Identity** and expand the list to check the values for Identity tags.



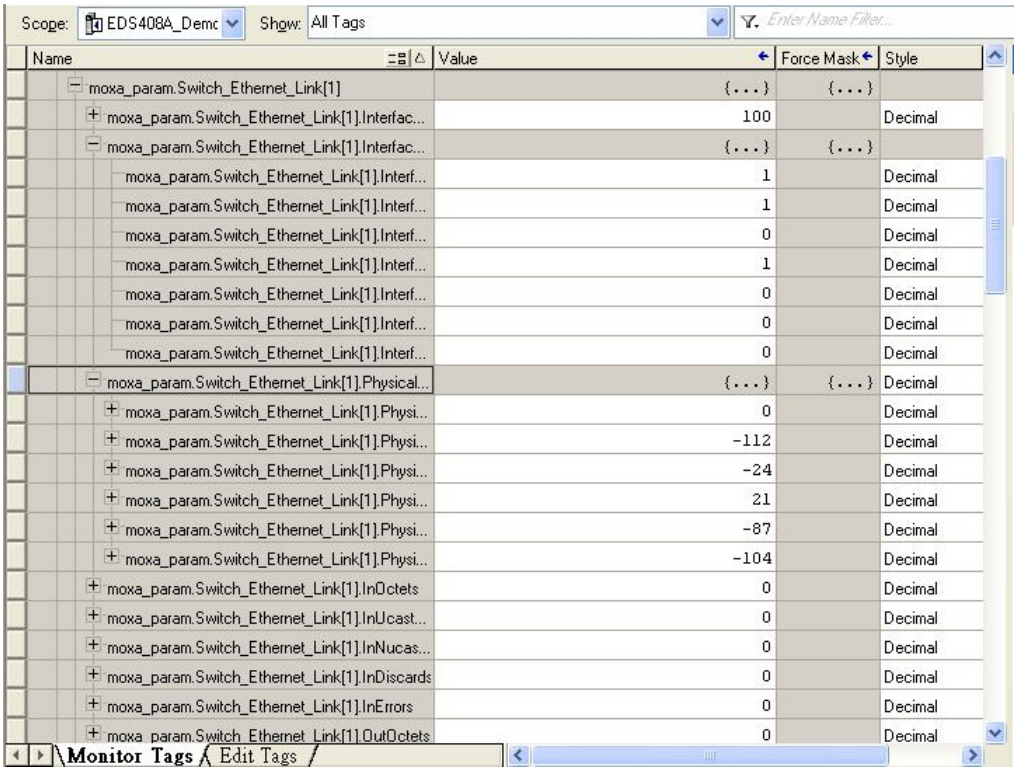

## Monitor Tags for TCPIP Object

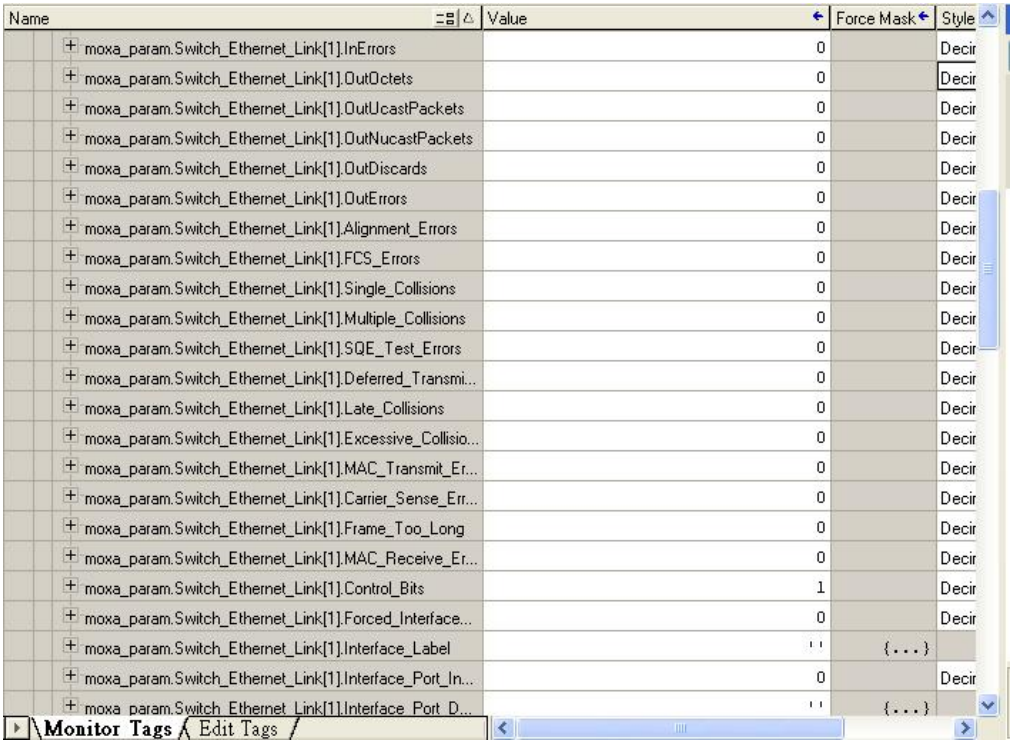
Click **moxa_param Switch_TCPIP** and expand the list to check the values for TCPIP tags.

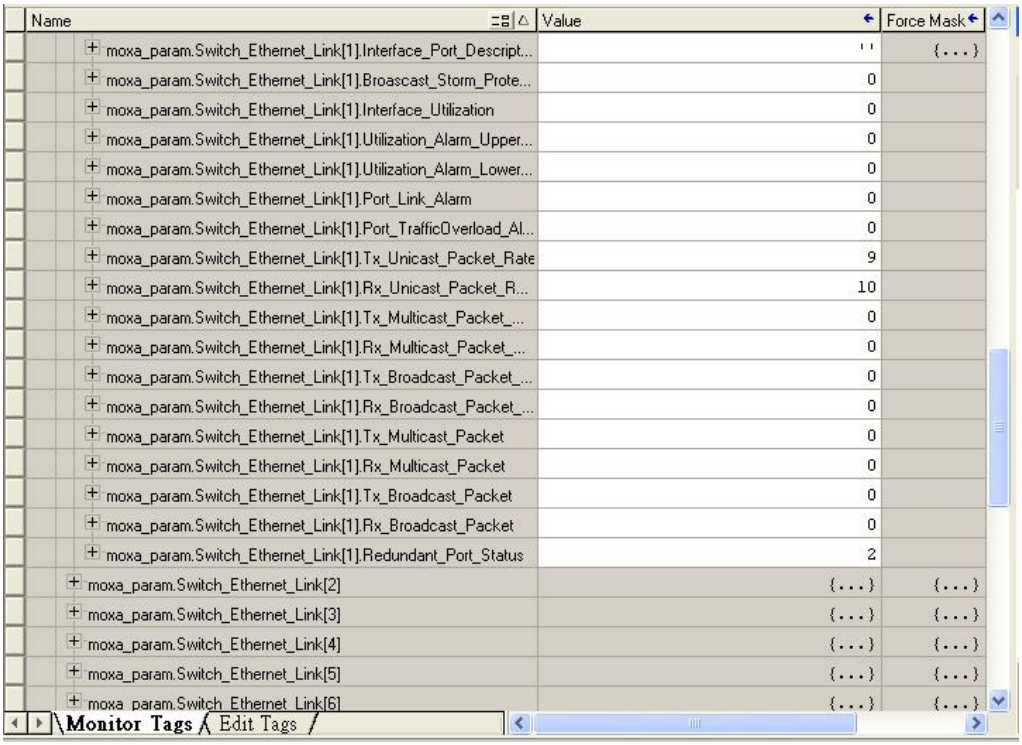


# Monitor Tags for Ethernet Link Object

Click **moxa_param Switch_Ethernet_Link** and expand the list to check the values for per port Ethernet Link tags.

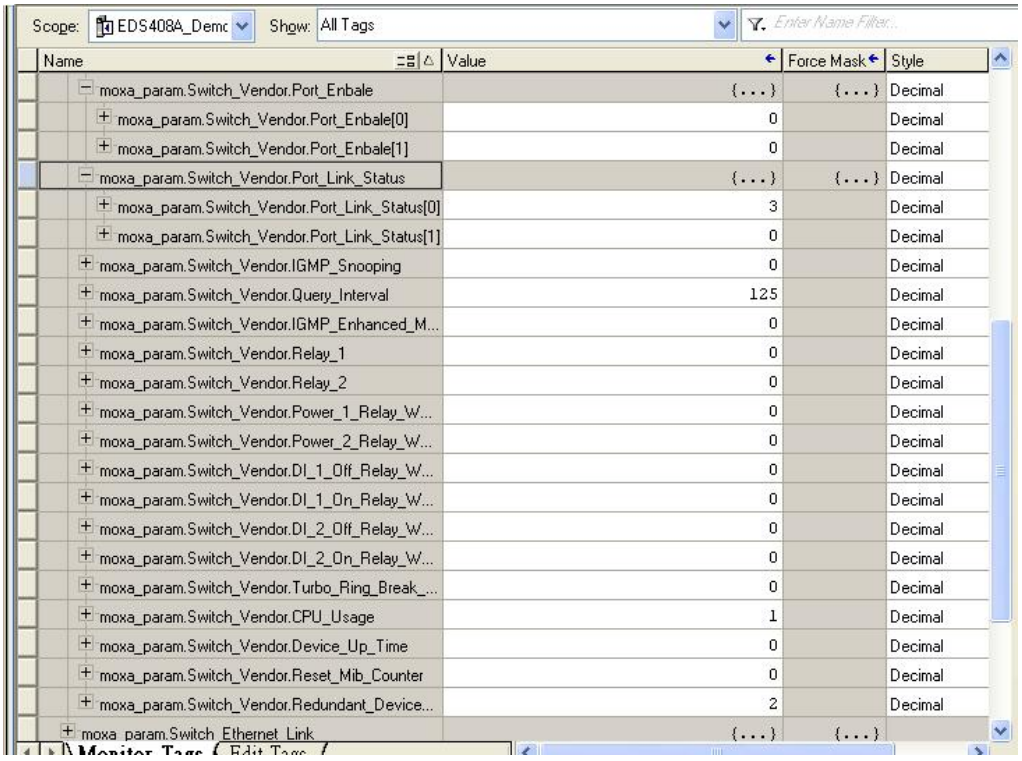





## Monitor Tags for Moxa Networking Object

Click **moxa_param Switch_Vendor** and expand the list to check the values for Moxa custom tags.



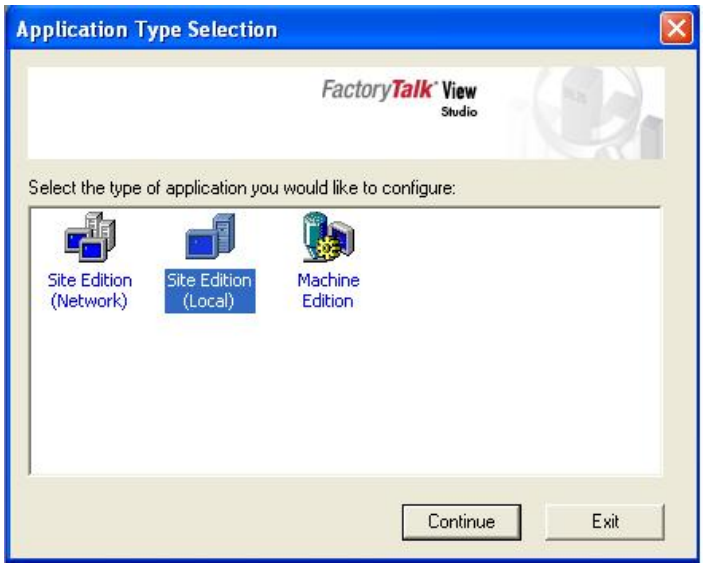
# Rockwell FactoryTalk® View Faceplate

## FactoryTalk® View Faceplate Installation

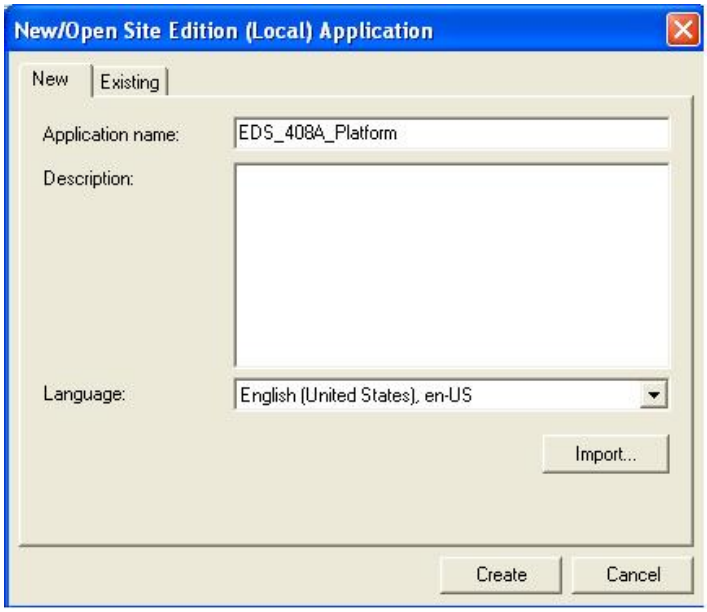
To install the faceplate, you must have Rockwell FactoryTalk® View Studio SE (Site Edition) version 5 or later and a Moxa managed Ethernet switch with firmware version 3.0 or later.

### Create a FactoryTalk® View Shortcut to the PLC

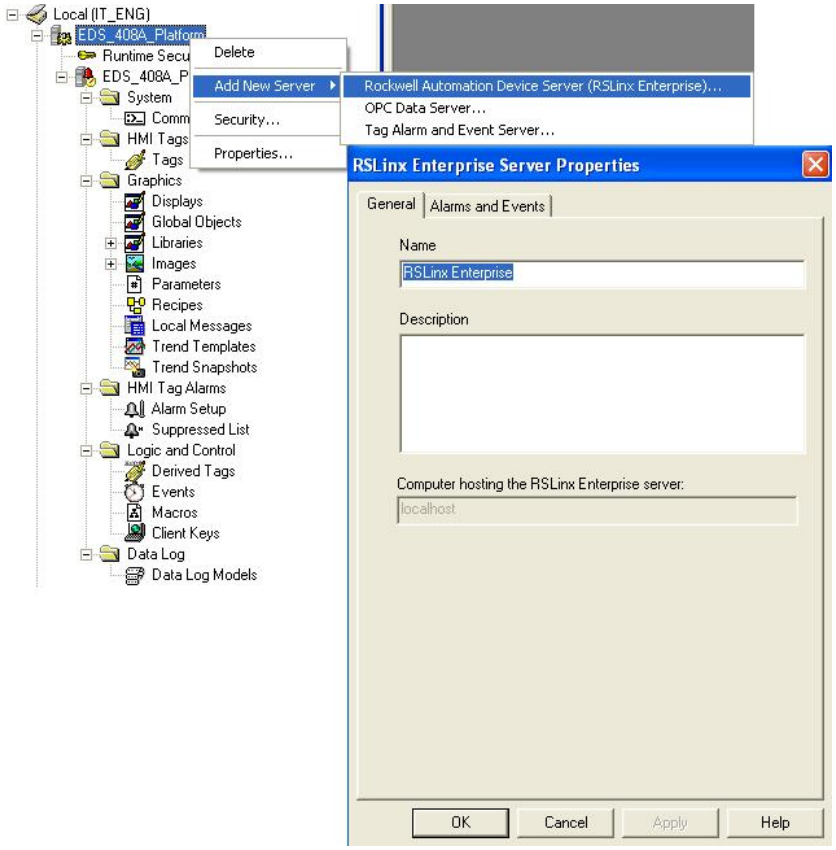
1. Start the FactoryTalk® View Studio software and select **Site Edition (Local)**.



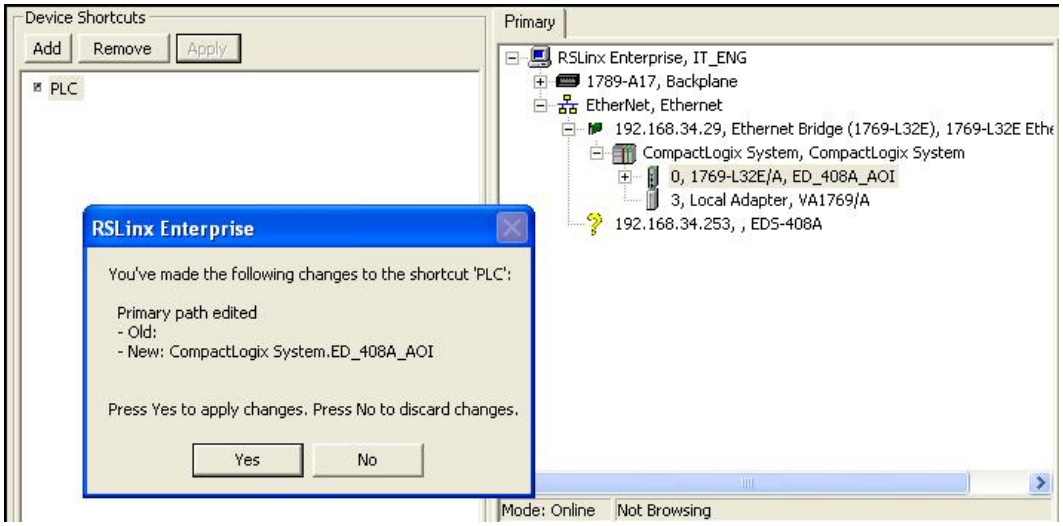

2. Add a new Site Edition (Local) and enter the Application name.



3. Configure a shortcut to the PLC that is running the Moxa AOI.
   In the Explorer window, right click the newly-added application, select **Add New Server** and **Rockwell Automation Device Server (RSLinx Enterprise)**, and click OK.

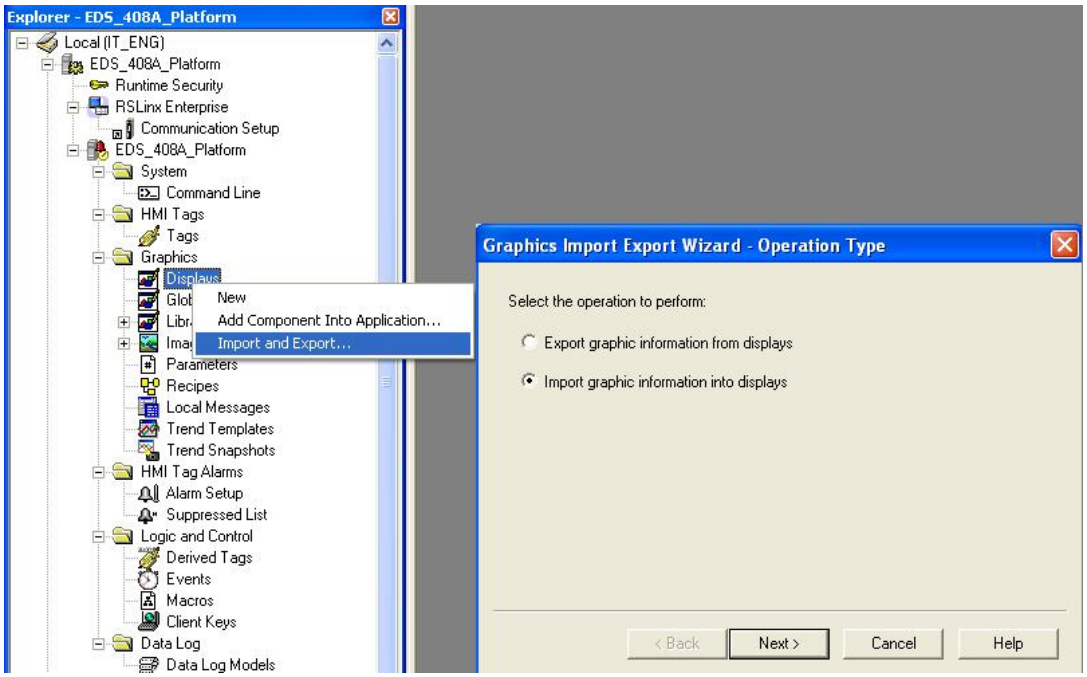



4. The shortcut is named PLC. Click "Yes" to apply the configuration.

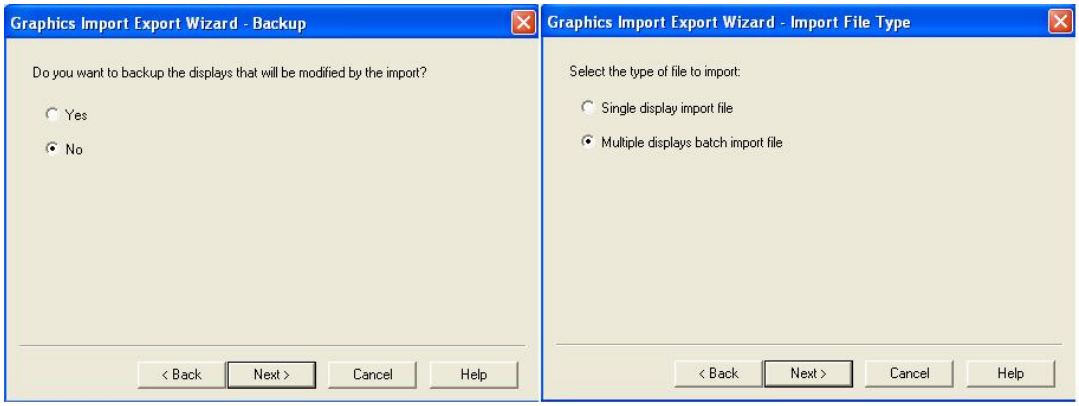


# Import FactoryTalk® View Faceplate Graphics

1. Right click Display in the FactoryTalk® View Explorer window, select **Import and Export** and choose **Import graphic information into displays**.

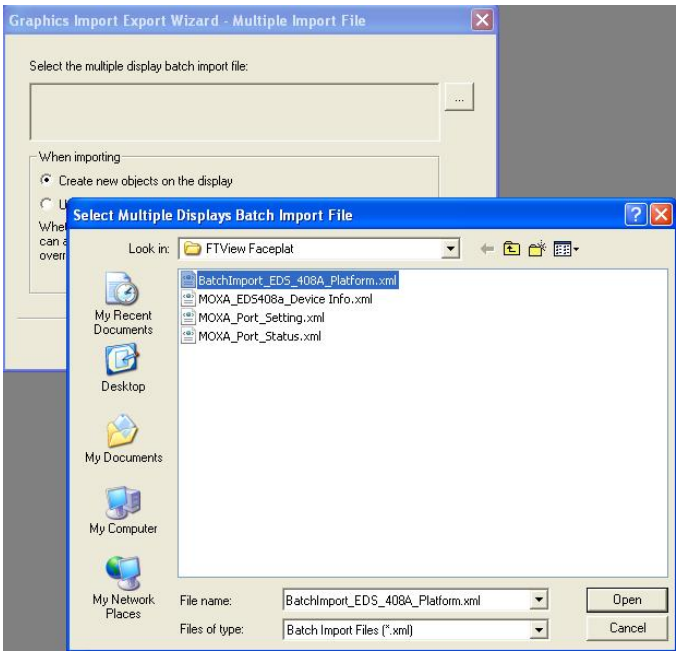



2. Select **No** and **Multiple displays batch import file**

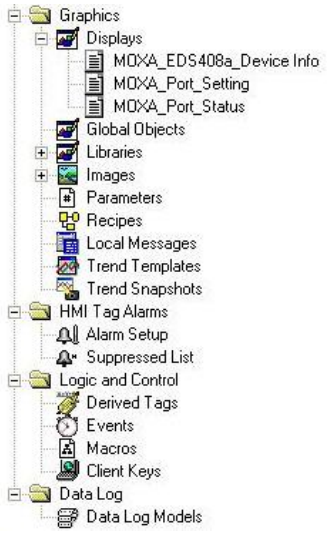

Graphics Import Export Wizard - Backup
Do you want to backup the displays that will be modified by the import?
Yes
No
< Back
Next >
Cancel
Help
Graphics Import Export Wizard - Import File Type
Select the type of file to import:
Single display import file
Multiple displays batch import file
< Back
Next >
Cancel
Help

3. Import all graphics files for FactoryTalk® View faceplate display.

**NOTE** Moxa provides sample graphics files for selected switches, which are available for download at the Moxa website or from the software CD.



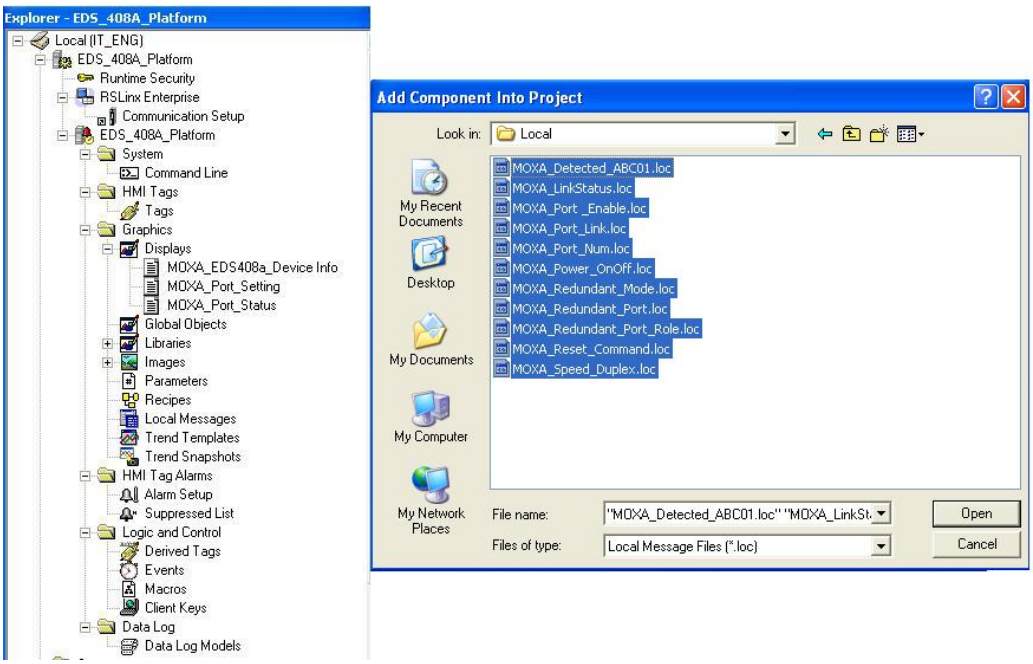

4. After import, these objects will appear under **Displays** in the Explorer window.



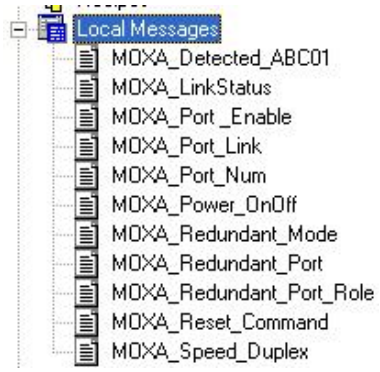

## Import FactoryTalk® View Faceplate Local Message

1. Right click **Local Message** in the FactoryTalk® View Explorer window, select **Add Component Into Application** and import all the local message files (.loc)

| | |
|---|---|
| **NOTE** | Moxa provides sample local message files for selected switches, which are available for download at the Moxa website or from the software CD.. |



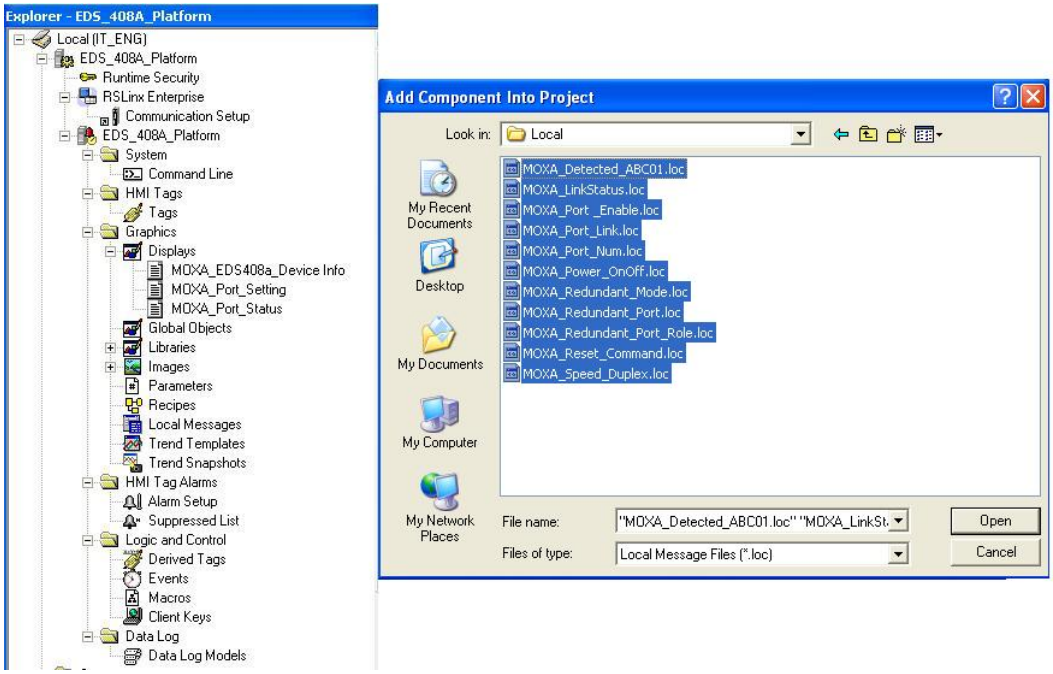

2. After import, these objects will appear under "Local Message" in the Explorer window.

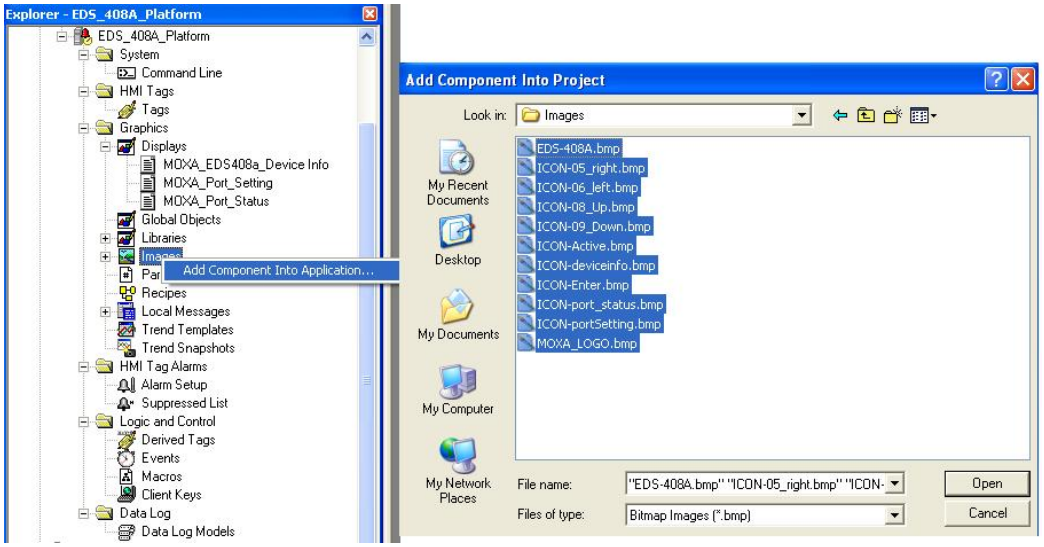



## Import FactoryTalk® View Faceplate Images

1. Right click **Images** in the FactoryTalk® View Explorer window, select **Add Component Into Application** and import all the image files (.bmp)

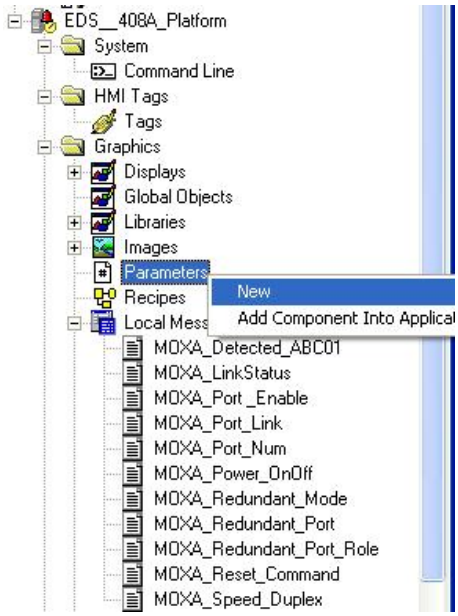
| | |
|---|---|
| **NOTE** | Moxa provides sample image files for selected switches, which are available for download at the Moxa website or from the software CD. |


Explorer - EDS_408A_Platform
Local (IT_ENG)
EDS_408A_Platform
Runtime Security
RSLinx Enterprise
Communication Setup
EDS_408A_Platform
System
Command Line
HMI Tags
Tags
Graphics
Displays
MOXA_EDS408a_Device Info
MOXA_Port_Setting
MOXA_Port_Status
Global Objects
Libraries
Images
Parameters
Recipes
Local Messages
Trend Templates
Trend Snapshots
HMI Tag Alarms
Alarm Setup
Suppressed List
Logic and Control
Derived Tags
Events
Macros
Client Keys
Data Log
Data Log Models
Add Component Into Project
Look in:
Local
My Recent Documents
Desktop
My Documents
My Computer
My Network Places
MOXA_Detected_ABC01.loc
MOXA_LinkStatus.loc
MOXA_Port _Enable.loc
MOXA_Port_Link.loc
MOXA_Port_Num.loc
MOXA_Power_OnOff.loc
MOXA_Redundant_Mode.loc
MOXA_Redundant_Port.loc
MOXA_Redundant_Port_Role.loc
MOXA_Reset_Command.loc
MOXA_Speed_Duplex.loc
File name:
"MOXA_Detected_ABC01.loc" "MOXA_LinkSt.
Files of type:
Local Message Files (*.loc)
Open
Cancel

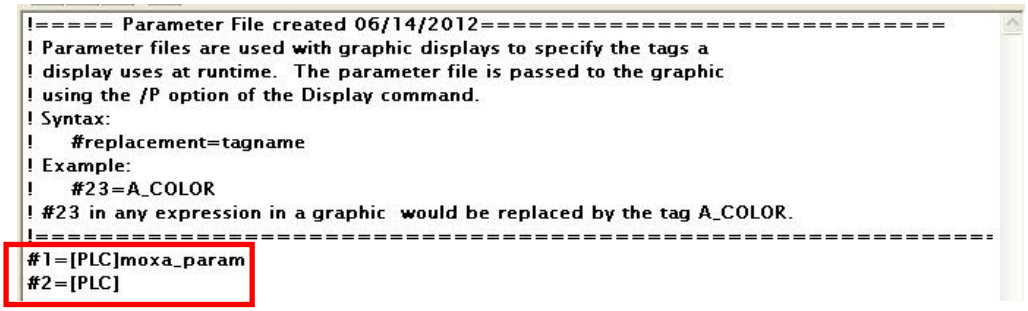

Explorer - EDS_408A_Platform
EDS_408A_Platform
System
Command Line
HMI Tags
Tags
Graphics
Displays
MOXA_EDS408a_Device Info
MOXA_Port_Setting
MOXA_Port_Status
Global Objects
Libraries
Images
Add Component Into Application...
Recipes
Local Messages
Trend Templates
Trend Snapshots
HMI Tag Alarms
Alarm Setup
Suppressed List
Logic and Control
Derived Tags
Events
Macros
Client Keys
Data Log
Data Log Models
Add Component Into Project
Look in:
Images
My Recent Documents
Desktop
My Documents
My Computer
My Network Places
EDS-408A.bmp
ICON-05_right.bmp
ICON-06_left.bmp
ICON-08_Up.bmp
ICON-09_Down.bmp
ICON-Active.bmp
ICON-deviceinfo.bmp
ICON-Enter.bmp
ICON-port_status.bmp
ICON-portSetting.bmp
MOXA_LOGO.bmp
File name:
"EDS-408A.bmp" "ICON-05_right.bmp" "ICON-
Files of type:
Bitmap Images (*.bmp)
Open
Cancel

## Create a New Parameter

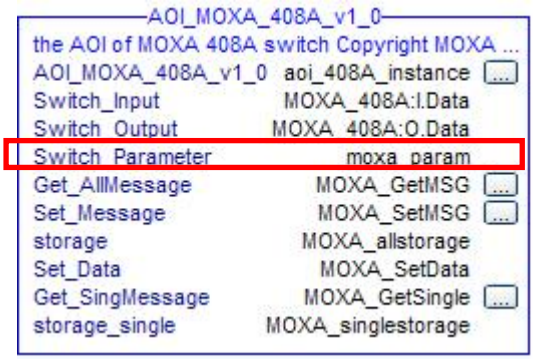
1. Right click **Parameters** in the FactoryTalk® View Explorer window, and select **New**




2. Create a parameter file that will be associated with the display.
   Manually input "#1=[PLC]moxa_param", and "#2=PLC" in the file.

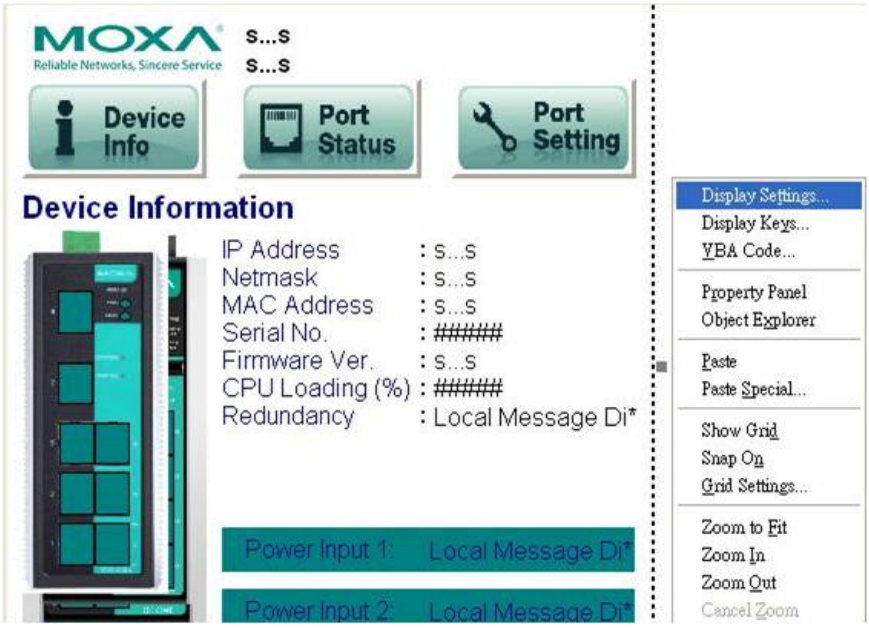

!===== Parameter File created 06/14/2012==========
! Parameter files are used with graphic displays to specify the tags a
! display uses at runtime. The parameter file is passed to the graphic
! using the /P option of the Display command.
! Syntax:
! #replacement=tagname
! Example:
! #23=A_COLOR
! #23 in any expression in a graphic would be replaced by the tag A_COLOR.
#1=[PLC]moxa_param
#2=[PLC]

   In the parameter definition, the shortcut **PLC** was created earlier. (Refer to **Create a FactoryTalk® View Shortcut to PLC**)
   Another important piece is **moxa_param**, which is the name of the Switch_Parameters tag created for the MOXA_SWITCH_AOI in your RSLogix project. (Refer to **Create and configure tags for the AOI**)

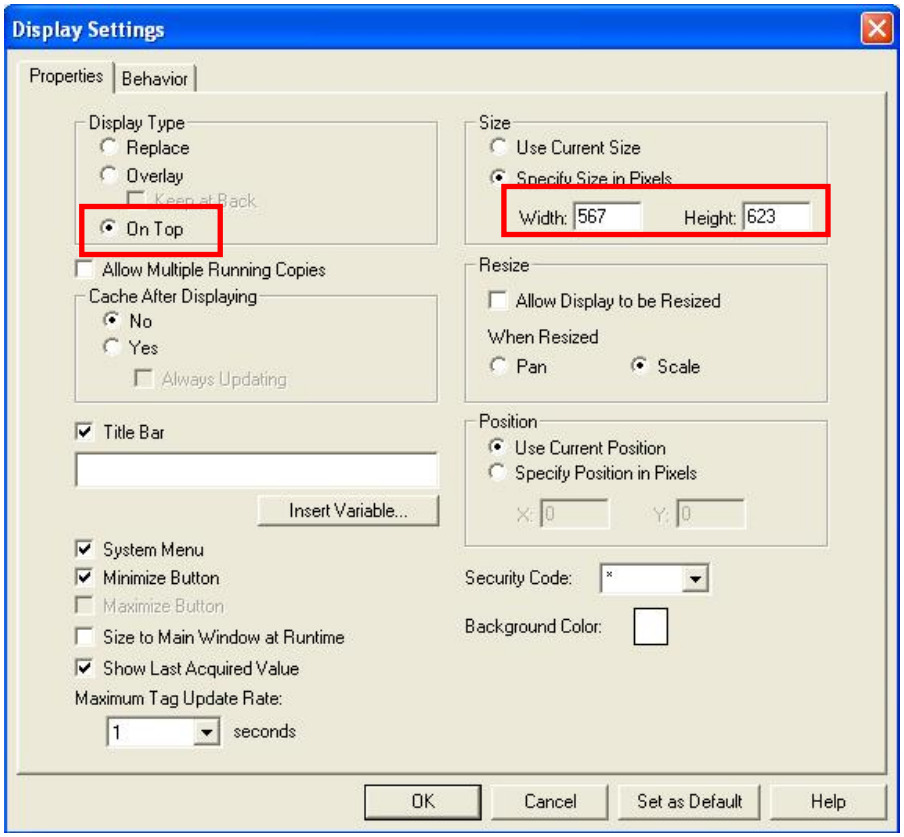


# Configure FactoryTalk® View Faceplate Display

1. Right click all parameter tabs under **Displays** in the FactoryTalk® View Explorer window, and select **Display Setting**.




2. Configure **Display Type** and **Size** as shown.
   For the Moxa custom faceplate, you need to configure three parameters: MOXA_Device Info; MOXA_Port_Setting; MOXA_Port_Status.

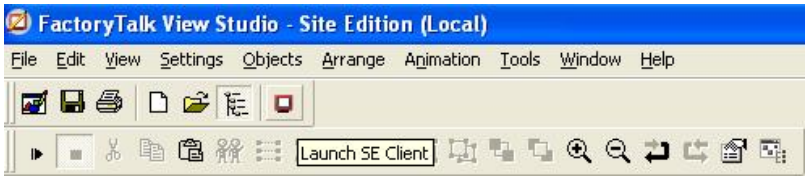


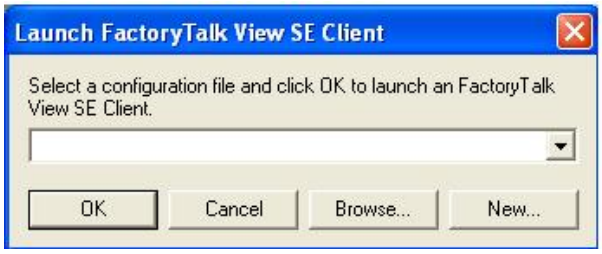
## Sample FactoryTalk® View Faceplate Project

For easier FactoryTalk® View Faceplate installation, Moxa also provides a sample project, in which all the parameters are configured with default values. The sample project is a (.APA) file, which is available for download from the Moxa website or software CD. You may import the sample project in FactoryTalk® View Faceplate Site Edition (SE).

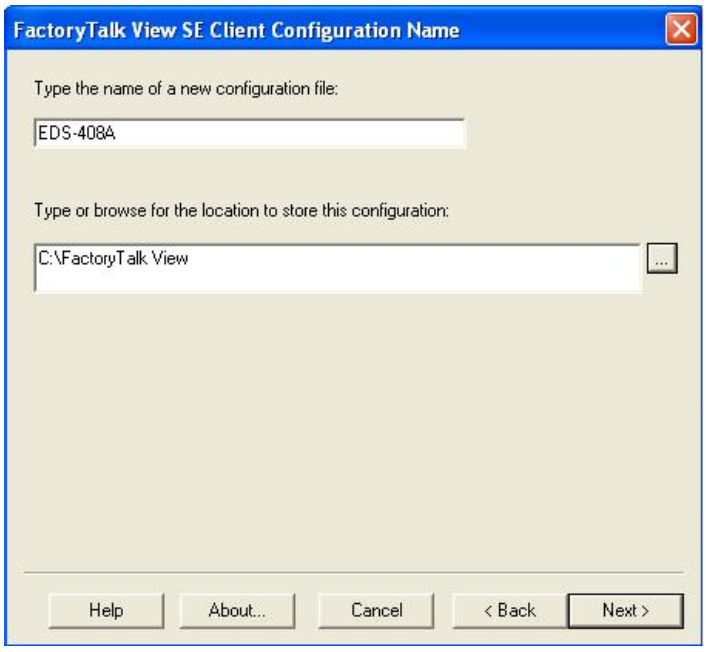
## Setting Up a FactoryTalk® View SE Client

1. Launch FactoryTalk® SE client

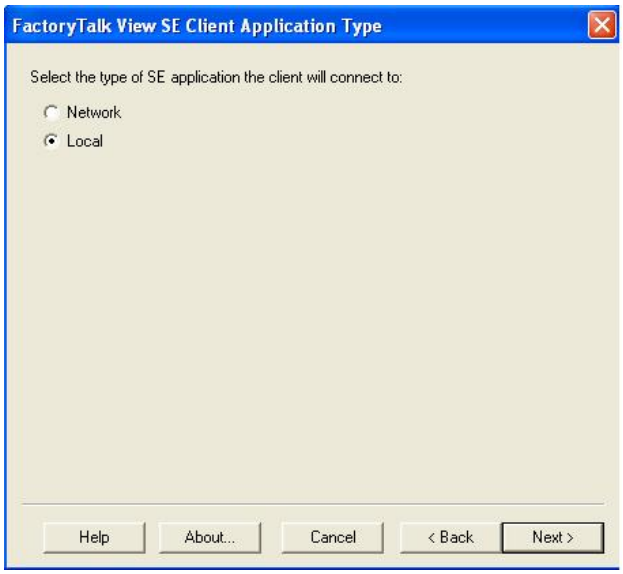

FactoryTalk View Studio - Site Edition (Local)
File Edit View Settings Objects Arrange Animation Tools Window Help
Launch SE Client



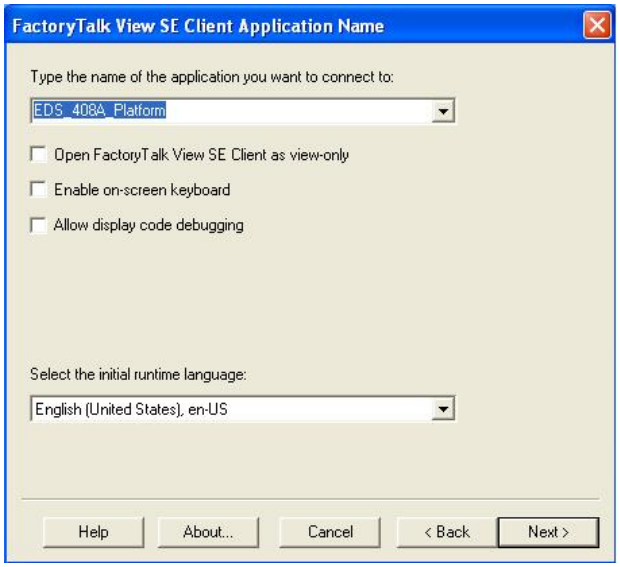

2. Set up the new configuration file name and path.



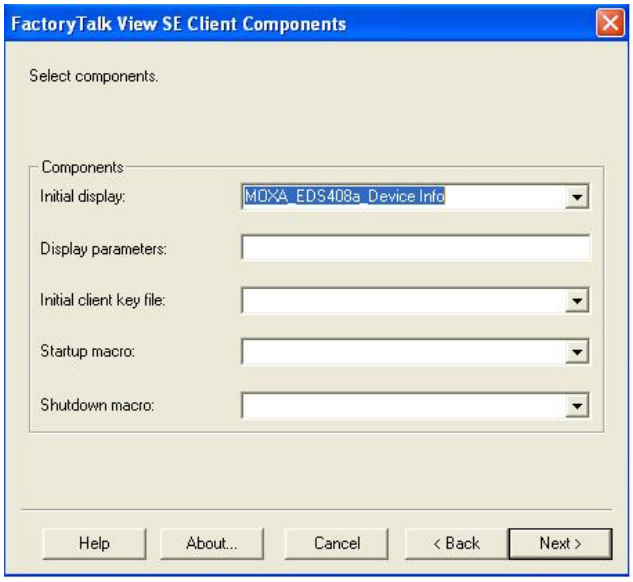
3. Select the application type **Local**



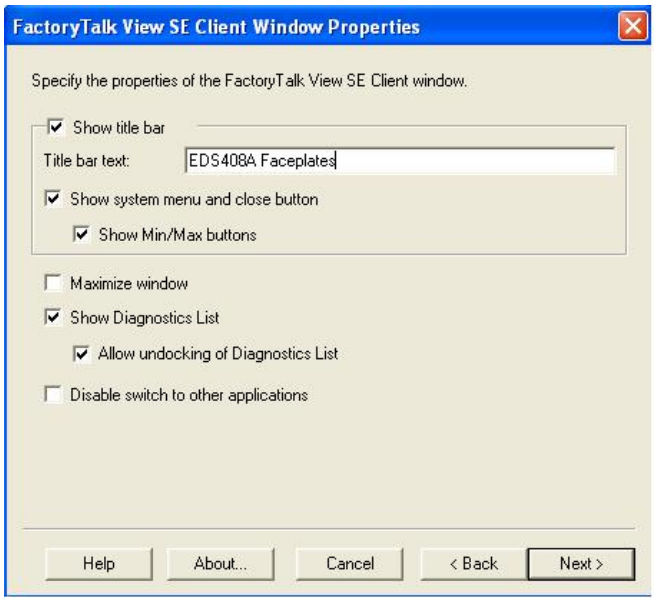

4. Enter the name of the application and select the language


FactoryTalk View SE Client Application Name
Type the name of the application you want to connect to:
EDS_408A_Platform
Open FactoryTalk View SE Client as view-only
Enable on-screen keyboard
Allow display code debugging
Select the initial runtime language:
English (United States), en-US
Help
About...
Cancel
< Back
Next >

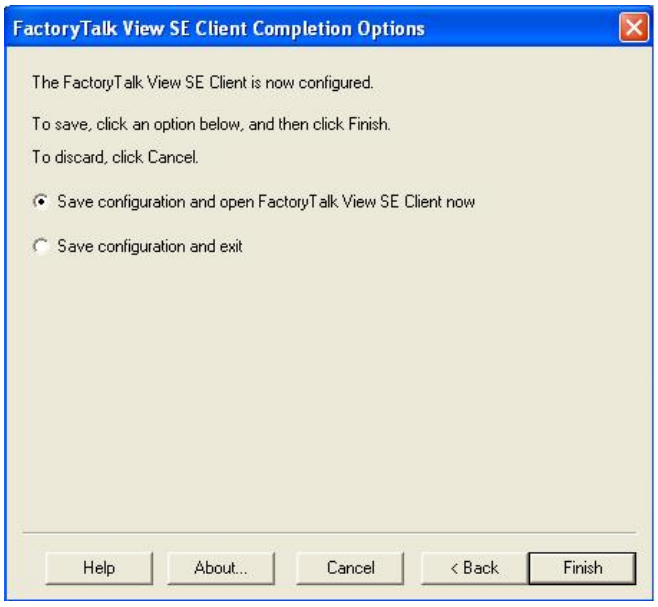
5. Configure the FactoryTalk® View SE Client Components and set **Initial Display** to **MOXA_Device_Info**



6. Configure the FactoryTalk® View SE Window Properties and input **Title bar text** with the text you would like to appear in the title bar.




7. Finish the setup and save the configuration

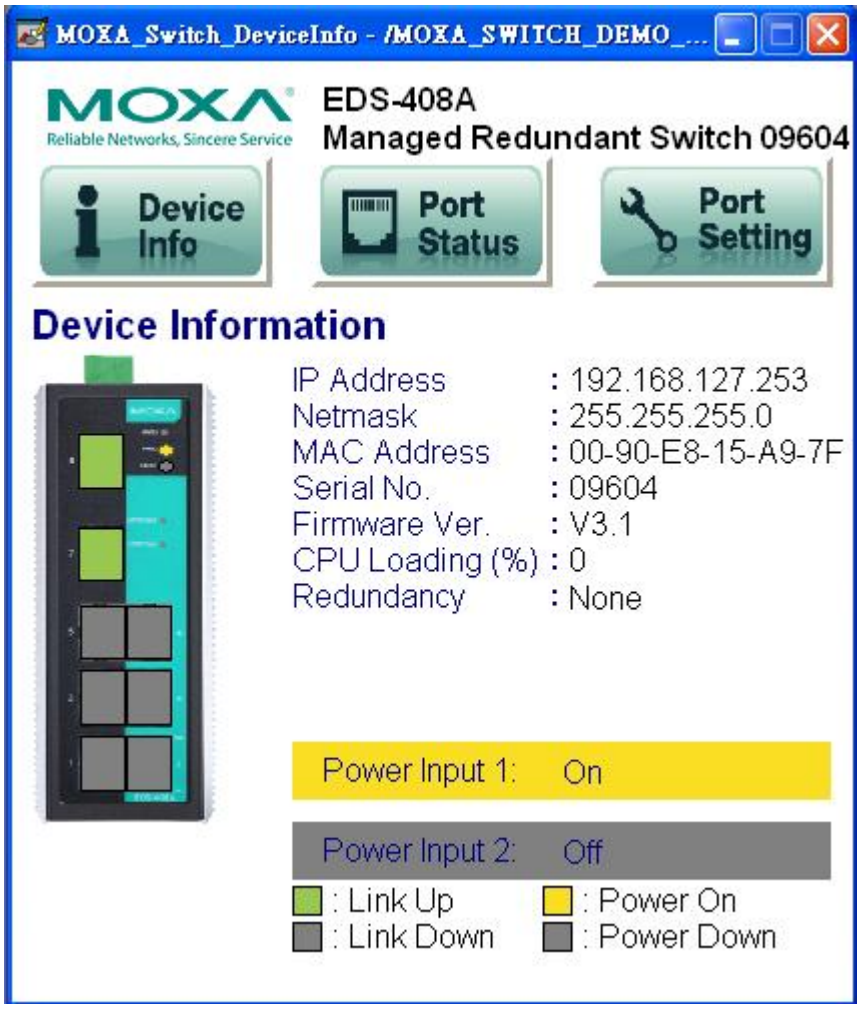

FactoryTalk View SE Client Completion Options
The FactoryTalk View SE Client is now configured.
To save, click an option below, and then click Finish.
To discard, click Cancel.
Save configuration and open FactoryTalk View SE Client now
Save configuration and exit
Help
About...
Cancel
< Back
Finish

# Introduction to the Moxa Custom Faceplate

The Moxa custom Faceplate consists of three main displays: Device Information, Port Status, and Port Setting. Click the tabs at the top of the screen to change between different displays.

## Device Information

The device information display shows general switch information and power and link status.



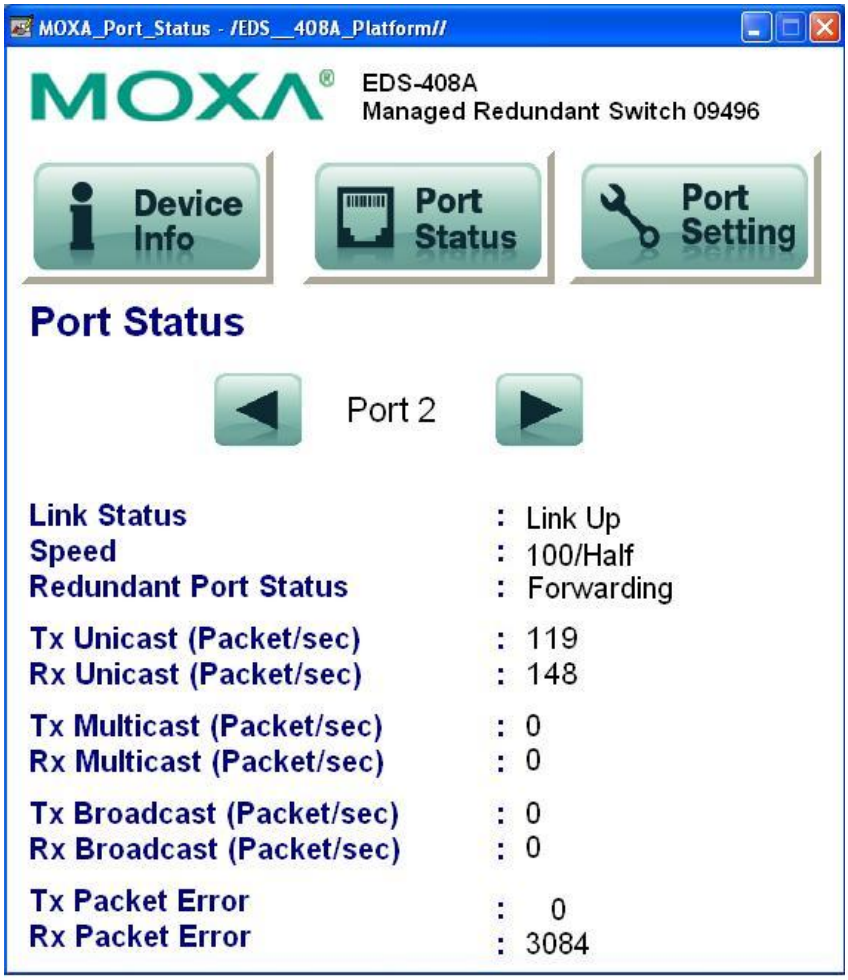

The following table describes fields and values.

| Field | Values | Description |
|---|---|---|
| IP Address | 192.168.192.253 (factory default) | Switch IP address |
| Netmask | 255.255.255.0 | Switch subnet mask |
| MAC Address | 00:90:E8:xx:xx:xx | MAC address of switch |
| Serial No. | Max. 5 characters | Switch serial number |
| Firmware Ver. | V3.1 | Software version of switch |
| CPU Loading (%) | 0-100% | CPU loading percentage |
| Redundant Protocol | RSTP<br>Turbo Ring<br>Turbo Ring v2<br>Turbo Chain<br>MSTP | Redundant protocol setting |
| Power Input 1 | On<br>Off | Power supply 1 status |
| Power Input 2 | On<br>Off | Power supply 2 status |
| Model name | EDS-XXX | Switch model name |
| Switch name | Max. 30 characters | User assigned switch name |

| Field | Color | State | Description |
|---|---|---|---|
| Link Status | Green | Link Up | Current port link state |
| | Grey | Link Down | |
| Power Status | Amber | Power On | Current power link state |
| | Grey | Power Off | |

## Port Status

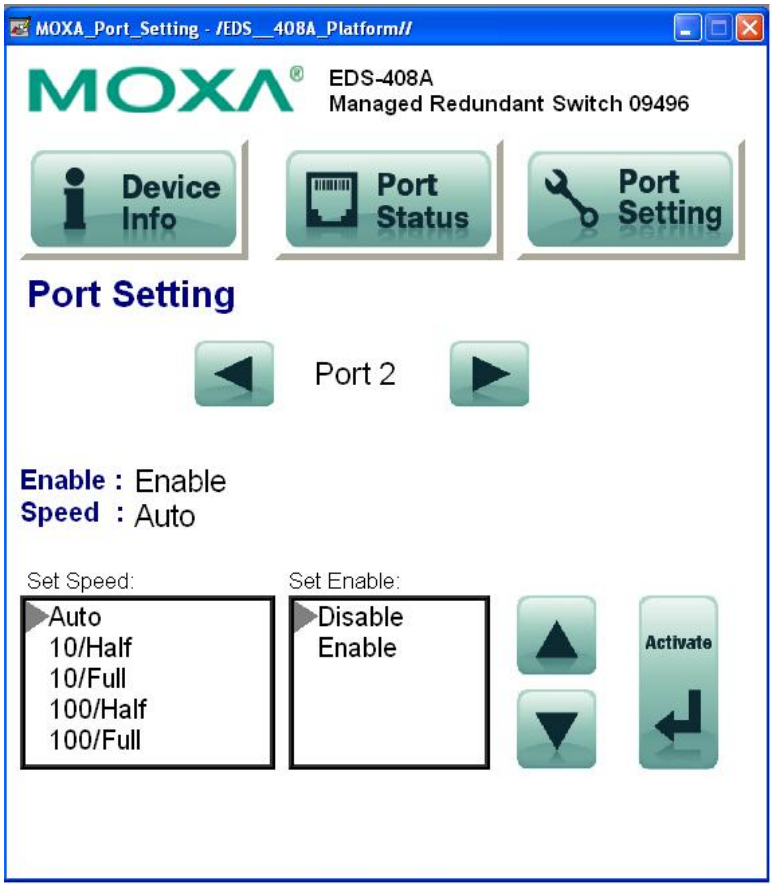
The port status display shows information for a selected switch port. Use the right/left buttons to select a switch port.




| Field | Values | Description |
|---|---|---|
| Port Index | Port 3 | Selected port number |
| Link status | Link up<br>Link down | Selected port link status |
| Speed | 10/Half<br>10/Full<br>100/Half<br>100/Full<br>1000/Half<br>Unknown | Selected port speed and mode |
| Redundant Port Status | Disable<br>Not Redundant Port<br>Link Down<br>Blocking<br>Learning<br>Forwarding | Selected port redundancy status |
| Tx Unicast (Packet/sec) | | The Tx unicast packets per second |
| Rx Unicast (Packet/sec) | | The Rx unicast packets per second |
| Tx Multicast (Packet/sec) | | The Tx multicast packets per second |
| Rx Multicast (Packet/sec) | | The Rx multicast packets per second |
| Tx Broadcast (Packet/sec) | | The Tx broadcast packets per second |
| Rx Broadcast (Packet/sec) | | The Rx broadcast packets per second |
| Tx Packet Error | | The number of Tx packet error |
| Rx Packet Error | | The number of Rx packet error |

## Port Setting

The Port Setting allows some switch port settings to be changed. Use the right/left buttons to select a switch port and click the **Activate** button to save the change.




| Field | Values | Description |
|---|---|---|
| Port Index | Port 3 | Selected port number |
| Speed | 10/Half<br>10/Full<br>100/Half<br>100/Full<br>1000/Half<br>Unknown | Selected port speed and mode |
| Enable | Enable<br>Disable | Selected port enable or disable |

# 3

# PROFINET I/O

# Introduction

**This section is supported only with EDS-400A-PN, EDS-510E, and EDS-G500E series devices.**

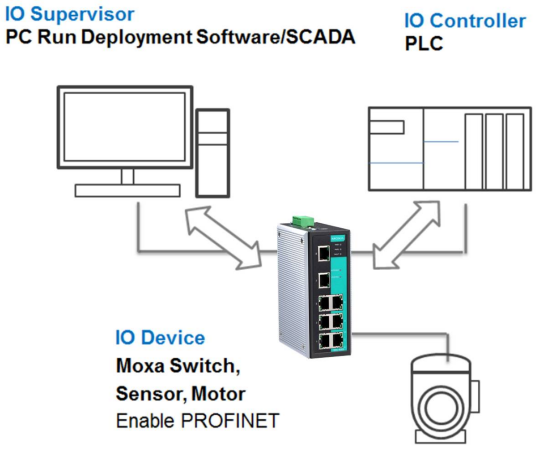
PROFINET is a communication standard for automation of PROFIBUS & PROFINET International (PI). It is 100% Ethernet-compatible as defined in IEEE standards. With PROFINET, applications can be implemented for production and process automation, safety applications, and the entire range of drive technology. With its integrated Ethernet-based communication, PROFINET satisfies a wide range of requirements, from data-intensive parameter assignment to extremely fast I/O data transmission.

PROFINET I/O is used for data exchange between I/O controllers (PLC, etc.) and I/O devices (field devices). This specification defines a protocol and an application interface for exchanging I/O data, alarms, and diagnostics. And its real-time (RT) solution allows response time in the range of 5 ms, which corresponds to today's PROFIBUS DP applications.

# PROFINET Environmental Introductions

## PROFINET Networking Structure

PROFINET I/O follows the Provider/Consumer model for data exchange. PROFINET forms logical link relationships between network character types. They are shown below.




There are 3 major character types defined by PROFINET I/O, including I/O controller, I/O supervisor, and I/O devices. Switches are considered I/O devices.

### I/O Controller

This is typically the programmable logic controller (PLC) on which the automation program runs. The I/O controller provides output data to the configured I/O-devices in its role as provider and is the consumer of input data of I/O devices.

### I/O Supervisor

This can be a programming device, personal computer (PC), or human machine interface (HMI) device for commissioning or diagnostic purposes.

### I/O Device

An I/O device is a distributed I/O field device that is connected to one or more I/O controllers via PROFINET I/O. The I/O device is the provider of input data and the consumer of output data.

## PROFINET I/O Devices

The MOXA switch is a PROFINET I/O device. A device model describes all field devices in terms of their possible technical and functional features. It is specified by the DAP (Device Access Point) and the defined modules for a particular device family. A DAP is the access point for communication with the Ethernet interface and the processing program.

## PROFINET Protocols

### DCP

In PROFNET I/O, each field device has a symbolic name that uniquely identifies the field device within a PROFINET I/O system. This name is used for assigning the IP address and the MAC address. The DCP protocol (Dynamic Configuration Protocol) integrated in every I/O device is used for this purpose.

### DHCP

Because DHCP (Dynamic Host Configuration Protocol) is in widespread use internationally, PROFINET has provided for optional address setting via DHCP or via manufacturer-specific mechanisms.

### PROFINET Type LLDP

Automation systems can be configured flexibly in a line, star, or tree structure. To compare the specified and actual topologies, to determine which field devices are connected to which switch port, and to identify the respective port neighbor, LLDP according to IEEE 802.1AB was applied in PROFINET I/O.

PROFINET filed bus exchange existing addressing information with connected neighbour devices via each switch port. The neighbor devices are thereby unambiguously identified and their physical location is determined.

## Device descriptions

### GSD file

The GSD files (General Station Description) of the field devices to be configured are required for system engineering. This XML-based GSD describes the properties and functions of the PROFINET I/O field devices. It contains all data relevant for engineering as well as for data exchange with the device.
Find your field device GSD file in the CD or download the GSD file from the MOXA web site.

# Configuring PROFINET I/O on Moxa Switches

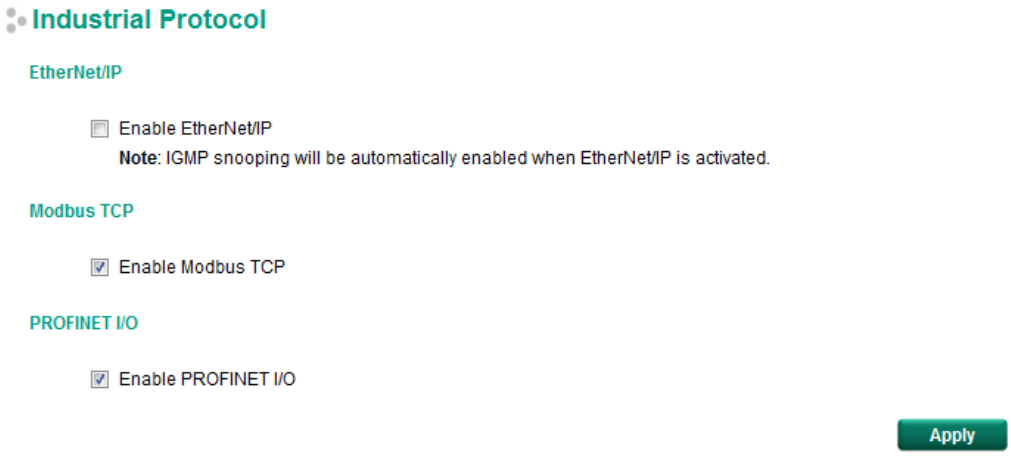
## Enable PROFINET I/O

### Enable PROFINET in WEB UI

#### Type 1

Select the **Enable** option and click **Activate** to enable PROFINET I/O. With PROFINET I/O enabled, PROFINET type LLDP will be enabled automatically.
Select the **Disable** option and click **Activate** to disable PROFINET I/O, the switch will disable PROFINET type LLDP and use standard LLDP.
PROFINET special model is enabled by default on the EDS-400A-PN series switches.

#### Type 2: New UI 2.0




The default PROFINET I/O setting of EDS E series is disabled. To enable the PROFINET I/O support, check the **Enable PROFINET I/O** and click **Apply**.

**NOTE:** Enabling PROFINET will prevent MXview (2.2 and earlier versions) from performing auto-detection of network topology. Auto-detection of network topology is only supported by versions of MXview 2.3 and later. To use auto-detection in earlier versions of MXview (2.2 and earlier), you should first disable PROFINET I/O, perform MXview auto-detection of network topology, and then enable PROFINET I/O.

### CLI

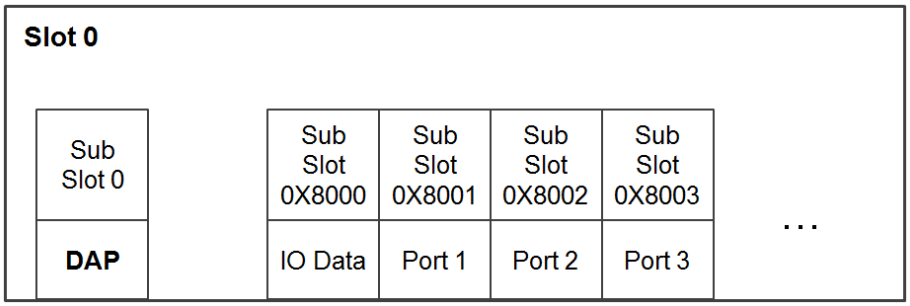
The CLI (command line interface) can be used to enable or disable PROFINET for the switch.
Command List:

- **profinetio** to enable PROFINET I/O.
- **no profinetio** to disable PROFINET I/O.

```
EDS-408A-SS-SC-PN# con
EDS-408A-SS-SC-PN(config)# profinetio
```

# Addressing of I/O Data in PROFINET I/O Based on Slot and Sub-Slots

The concept of the MOXA PROFINET switch with GSD version 2 is shown the table below. In this structure, each switch port represents one sub-slot.




## Manufacturer Information

Each PROFINET device is addressed based on a MAC address. This address is unique worldwide. The company code (bits 47 to 24) can be obtained from the IEEE Standards Department free of charge. This part is called the OUI (organizationally unique identifier).

Table. MOXA OUI

| Bit Value 47..24 | | | | | | Bit Value 23..0 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 2 | 2 | 9 | x | x | x | x | x | x |
| Company Code (OUI) | | | | | | Consecutive Number | | | | | |

# PROFINET Attributes

The PROFINET I/O connection can be configured for both cyclic I/O data and I/O parameters. I/O parameters are acyclic I/O data. These are major setup and monitor attributes in PROFINET.

- **Cyclic I/O Data**
  Cyclic I/O data are always sent between the PLC and Switches at the specified periodic time. These data are transmitted almost real time. For example, status information from the Switches, and variables to be written to the Switch would typically be part of the cyclic data.
- **I/O Parameters**
  PROFINET I/O parameters are defined for device configuration and status monitoring. These data are useful for infrequent data transfers, or for very large data transfers. Only transfer when needed
- **Alarm**

  Alarms are mainly PROFINET I/O transmitted high-priority events. Alarm data are exchanged between an I/O device and an I/O controller. Once an event triggers it, the switch will send the alarm to the PLC immediately. Enable or disable these alarms by setting I/O parameters.

# PROFINET Cyclic I/O Data

The MOXA PROFINET switch provides PROFINET I/O cyclic data and includes the following items:

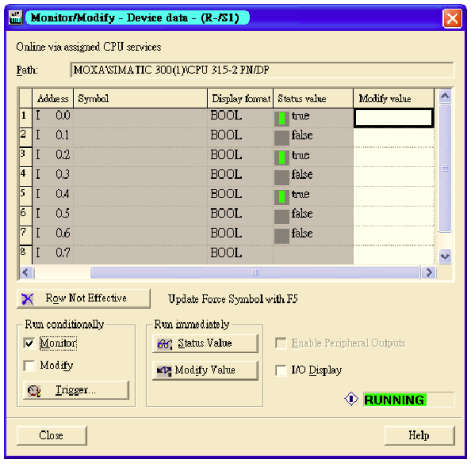
**NOTE:** The default transfer frequency of PROFINET Cyclic I/O data is 128 ms. There are 3 options available in SIMATIC STEP 7: 128/256/512 ms.

**PROFINET Cyclic I/O Data Table**

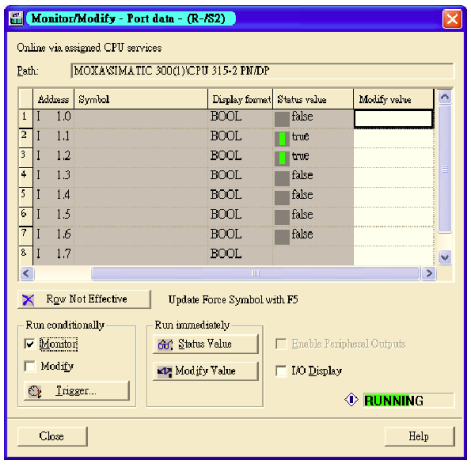
| Category | Direction | Byte | Bit | Name | Description |
|---|---|---|---|---|---|
| Device | Input | 0 | 0 | Device status | 0 is failed status, 1 is OK. |
| | | | 1 | Power 1 | 0 is unavailable, 1 is OK |
| | | | 2 | Power 2 | 0 is unavailable, 1 is OK |
| | | | 3 | RSTP status | 0 is disabled, 1 is enabled |
| | | | 4 | Turbo Ring v1 | 0 is disabled, 1 is enabled |
| | | | 5 | Turbo Ring v2 | 0 is disabled, 1 is enabled |
| | | | 6 | Turbo Chain | 0 is disabled, 1 is enabled |
| | | | 7 | Turbo Ring v2 status | 0 is broken, 1 is healthy |
| Port | Input | 1 | 0 | Port 1 Connection | 0 is not connected, 1 is connected |
| | | | 1 | Port 2 Connection | 0 is not connected, 1 is connected |
| | | | 2 | Port 3 Connection | 0 is not connected, 1 is connected |
| | | | 3 | Port 4 Connection | 0 is not connected, 1 is connected |
| | | | 4 | Port 5 Connection | 0 is not connected, 1 is connected |
| | | | 5 | Port 6 Connection | 0 is not connected, 1 is connected |
| | | | 6 | Port 7 Connection | 0 is not connected, 1 is connected |
| | | | 7 | Port 8 Connection | 0 is not connected, 1 is connected |

You can monitor these attributes in SIMATIC STEP 7. Operation steps are in the Chapter "Monitoring the Switch"

Monitor Device I/O Cyclic Data in SIMATIC STEP 7




Monitor Port I/O Cyclic Data in SIMATIC STEP 7




# PROFINET I/O Parameters

MOXA defines comprehensive PROFINET I/O parameters for more flexible settings and monitoring. There attributes are readable or writable. PROFINET I/O parameters use PROFINET acyclic data to achieve communication in the network. You can use the SIMATIC STEP 7 tool or engineering deployment software to edit it. There are 3 categories of parameters, including Device Parameters, Device Status and Port Parameters. The following tables provide parameter information:

- **r/w:** Read and Write
- **ro:** Read Only

**Device parameters**

These parameters control PROFINET Alarm functions. PROFINET Alarm is a message which sends from switch to PLC immediately once the event is triggered.

| Byte | Name | Access | Value | Description | Default Value |
|---|---|---|---|---|---|
| 0 | Status Alarm | rw | 0 | Do not send any alarms | 0: No alarms |
| | | | 1 | Send alarm if any status change | |
| 1 | Power Alarm 1 | rw | 0 | Do not send power failed alarms | 0: No alarms |
| | | | 1 | Send alarm if power supply 1 fails | |
| 2 | Power Alarm 2 | rw | 0 | Do not send power failed alarms | 0: No alarms |
| | | | 1 | Send alarm if power supply 2 fails | |

**Device Status**

| Byte | Name | Access | Value | Description |
|---|---|---|---|---|
| 0 | Device Status | ro | 0 | Unavailable |
| | | | 1 | OK |
| | | | 2 | Device bootup fails |
| 1 | Fault Status | ro | 0 | Unavailable |
| | | | 1 | OK |
| | | | 2 | Device detect fault |
| 2 | Power 1 Status | ro | 0 | Unavailable |
| | | | 1 | OK |
| | | | 2 | Power 1 fails |
| 3 | Power 2 Status | ro | 0 | Unavailable |

| | | | | |
|---|---|---|---|---|
| | | | 1 | OK |
| | | | 2 | Power 2 fails |
| 4 | DI 1 Status | ro | 0 | Unavailable |
| | | | 1 | Closed |
| | | | 2 | Open |
| 5 | DI 2 Status | ro | 0 | Unavailable |
| | | | 1 | Closed |
| | | | 2 | Open |
| 6 | Redundant Mode | ro | 0 | Unavailable |
| | | | 1 | RSTP |
| | | | 2 | Turbo Ring V1 |
| | | | 3 | Turbo Ring V2 |
| | | | 4 | Turbo Chain |
| 7 | Ring Status | ro | 0 | Unavailable |
| | | | 1 | Healthy |
| | | | 2 | Break |
| 8 | Redundant Port 1 Status | ro | 0 | Unavailable |
| | | | 1 | Link is up |
| | | | 2 | Link is down |
| 9 | Redundant Port 2 Status | ro | 0 | Unavailable |
| | | | 1 | Link is up |
| | | | 2 | Link is down |
| 10 | Ring Coupling Mode | ro | 0 | Unavailable |
| | | | 1 | Backup |
| | | | 2 | Primary |
| | | | 3 | Dual homing |
| 11 | Coupling Port 1 Status | ro | 0 | Unavailable |
| | | | 1 | Link is up |
| | | | 2 | Link is down |
| 12 | Coupling Port 2 Status | ro | 0 | Unavailable |
| | | | 1 | Link is up |
| | | | 2 | Link is down |
| 13 | Connection | ro | 0 | Unavailable |
| | | | 1 | OK |
| | | | 2 | Connection failure |

**Port Parameters**

| Byte | Name | Access | Value | Description |
|---|---|---|---|---|
| 0 | Port Alarm | rw | 0 | Do not send alarm |
| | | | 1 | Send alarm when port link down |
| 1 | Port Admin State | rw | 0 | Unavailable |
| | | | 1 | Off |

| | | | | |
|---|---|---|---|---|
| | | | 2 | On |
| 2 | Port Link State | ro | 0 | Unavailable |
| | | | 1 | Link is up |
| | | | 2 | Link is down |
| 3 | Port Speed | ro | 0 | Unavailable |
| | | | 1 | 10 |
| | | | 2 | 100 |
| | | | 3 | 1000 |
| 4 | Port duplex | ro | 0 | Unavailable |
| | | | 1 | Half |
| | | | 2 | Full |
| 5 | Port Auto-negotiation | ro | 0 | Unavailable |
| | | | 1 | Off |
| | | | 2 | On |
| 6 | Port flow control | ro | 0 | Unavailable |
| | | | 1 | Off |
| | | | 2 | On |
| 7 | Port MDI/MDIX | ro | 0 | Unavailable |
| | | | 1 | MDI |
| | | | 2 | MDIX |

# Step 7 Integration

## Overview of Operation Procedure

The following steps show how to integrate the switch into a PROFINET network:

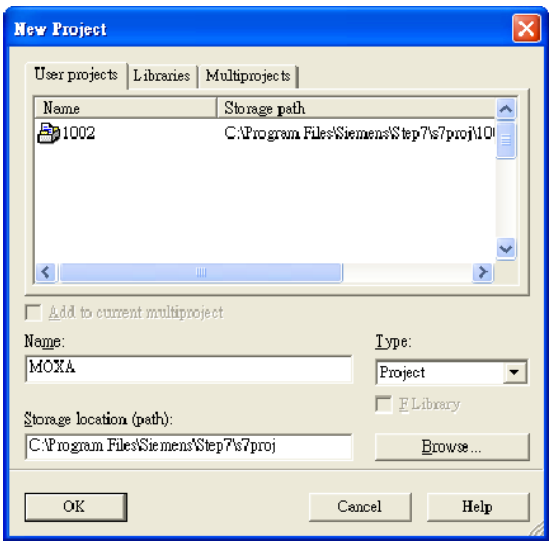
1. **Enable PROFINET on the switch**

Enable PROFIENT in switch web UI or by CLI commands

2. **Create a PROFINET I/O subnet project in STEP 7**
   Create a PROFINET I/O Ethernet project for deploying environment
3. **GSD file installation**
   Import MOXA switch GSD into the project
4. **Device configuration**
   Search and discover the switch in STEP 7. Configure PROFINET attributes such as IP address, device name and I/O parameters.
5. **Save and load the project into the PLC**
   Load this project and into the PLC
6. **Monitoring the Switch**
   Use STEP 7 to monitor switch attributes

# Create a PROFINET I/O Subnet Project

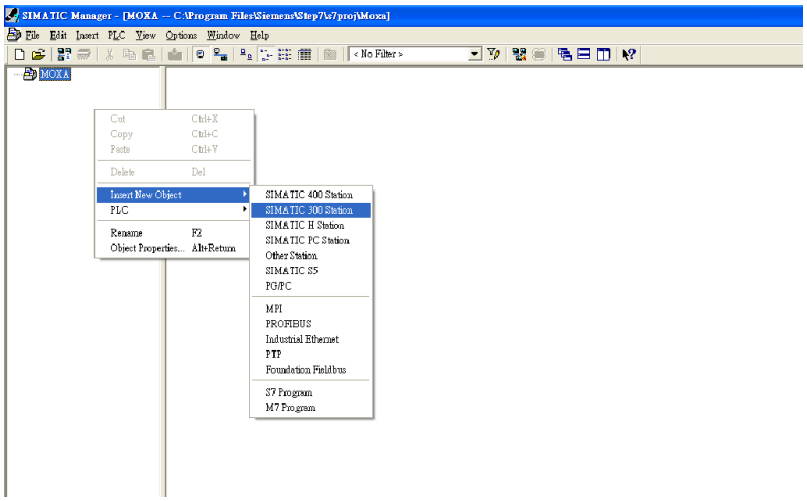
In SIMATIC Manager menu bar, click File > New Project



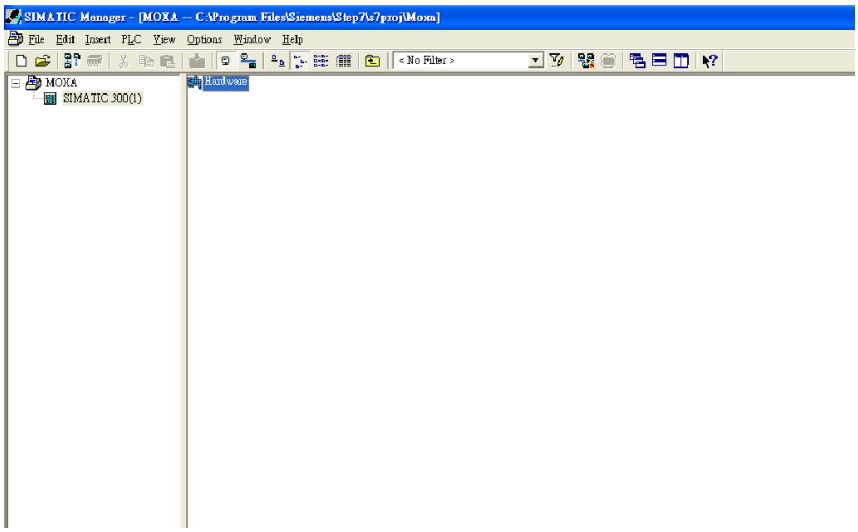

Name your project in the **Name** field then click **OK.**

Insert a station in your project

Right click in category column > **Insert New Object** > your PLC series (here we select SIMATIC 300 station).

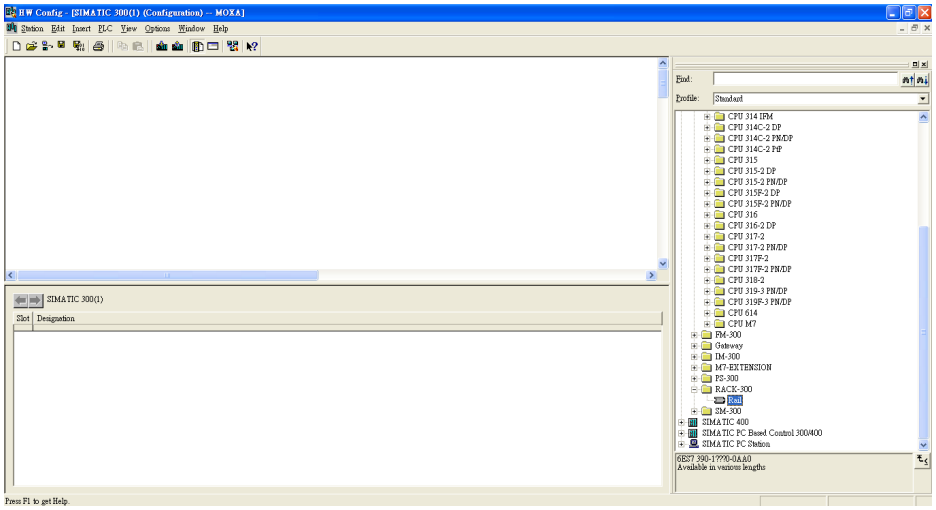



Then you can see the new object in the project. Double click on the **Hardware**.

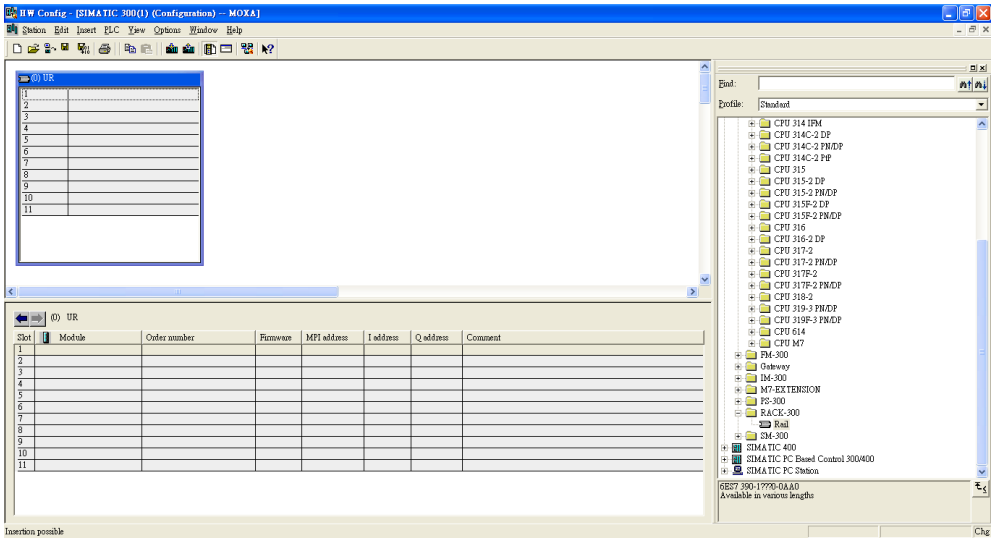



Add Rack in HW Config

After double-clicking on HW, you will see the **HW Config** window.



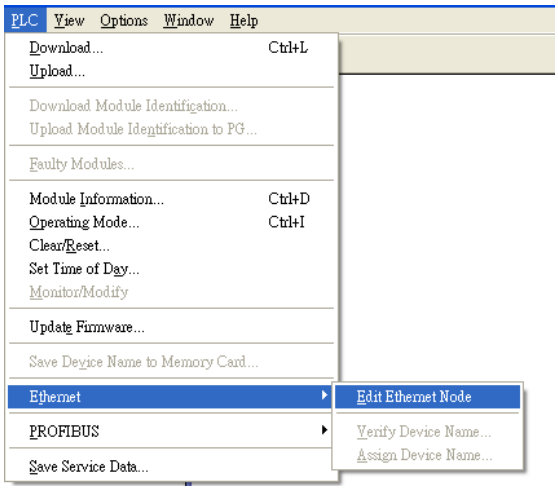

Drag a rack from the side bar to main dashboard. In here, we drag **Rail,** which is under the Rack-300 folder, to the main screen.



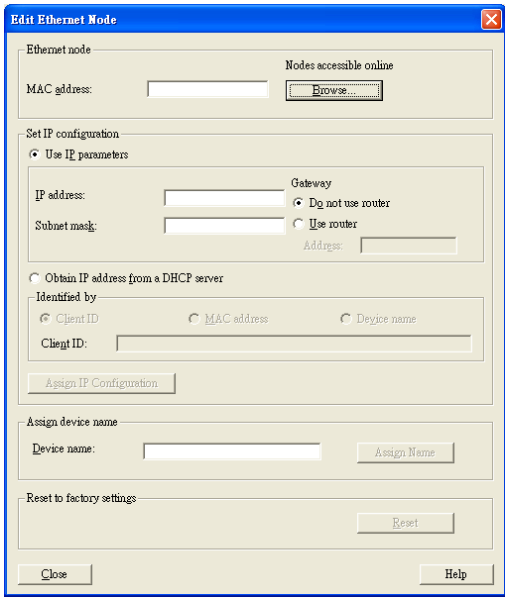

Search PRODINET Ethernet devices

Use **Edit Ethernet Node** to browse device information in PROFINET networks. Click **PLC** > **Ethernet** >

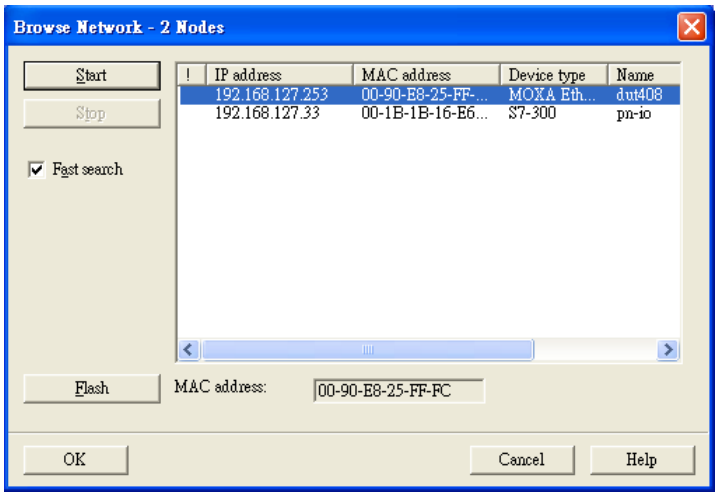
**Edit Ethernet Node**




Then click **Browse**

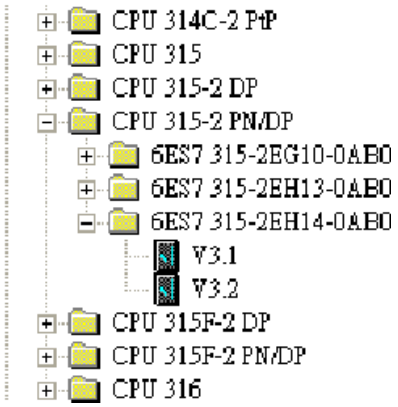



Click **Start** to search devices. Use STEP 7 through PROFINET DCP to discover devices in networks. Find PLC/switch IP addresses, MAC addresses, and device names here.

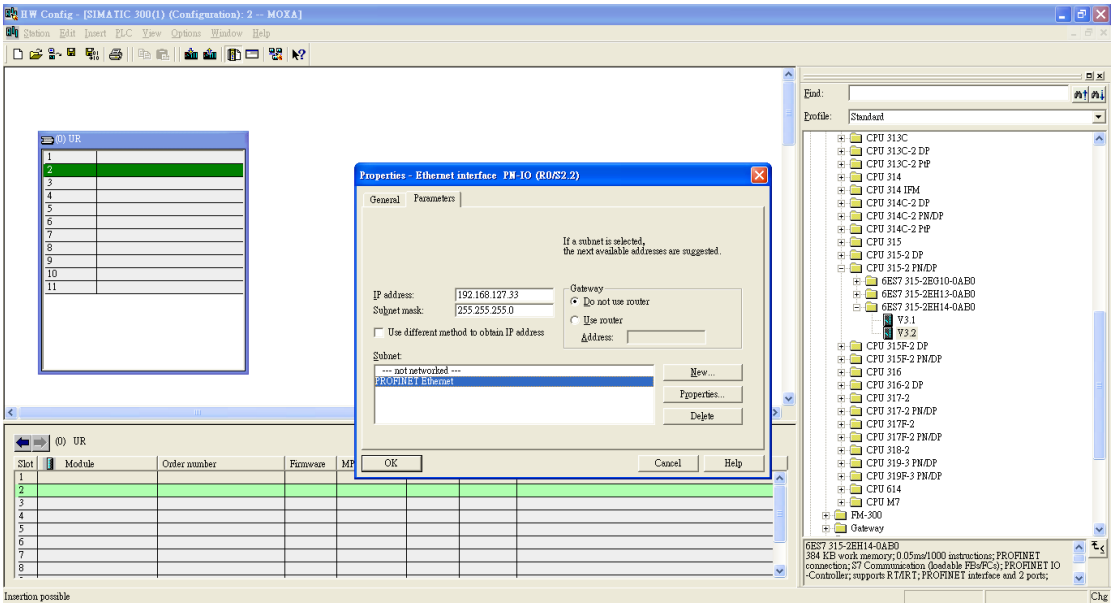



Add PLC CPU in HW Config

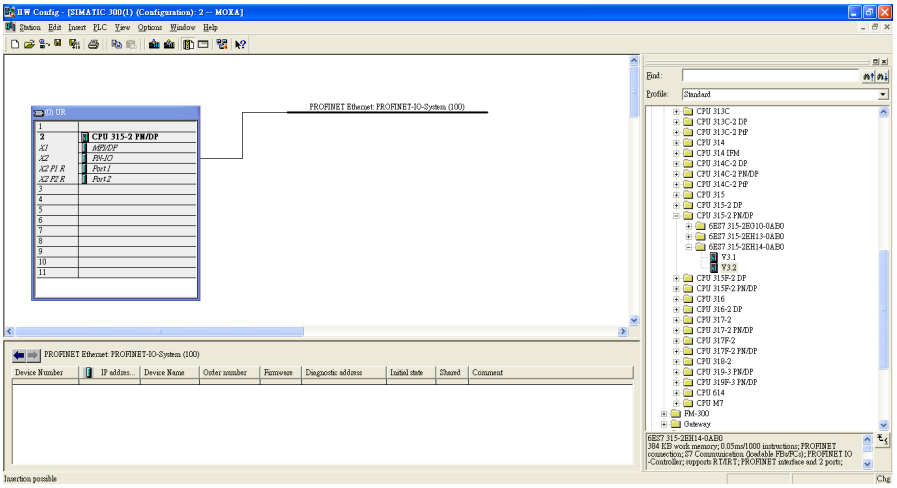
Select your PLC CPU and drag it to the rack slot 2. Please select by PLC you used. Here we will select 6ES7-315-2EH14-0AB0 V3.1.




Then click Properties, the Ethernet interface dialog will pop out. Fill in your PLC **IP address** in "IP address" column. Then click **New** in subnet to create a new Ethernet subnet. Here we will create a subnet named "PROFINET Ethernet"



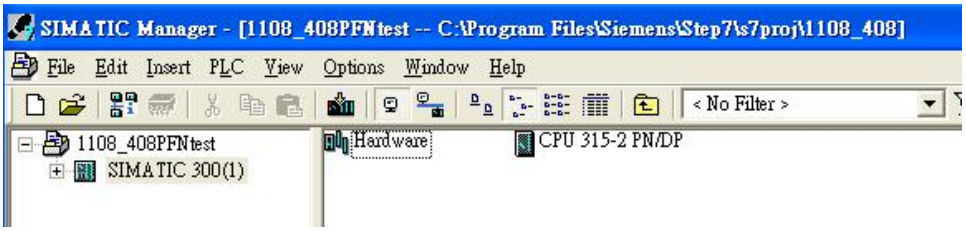

PROFINET I/O Ethernet subnet project accomplished


HW Config - [SIMATIC 300(1) (Configuration): 2 -- MOXA]
PROFINET Ethernet: PROFINET-IO-System (100)
CPU 315-2 PN/DP
Insertion possible

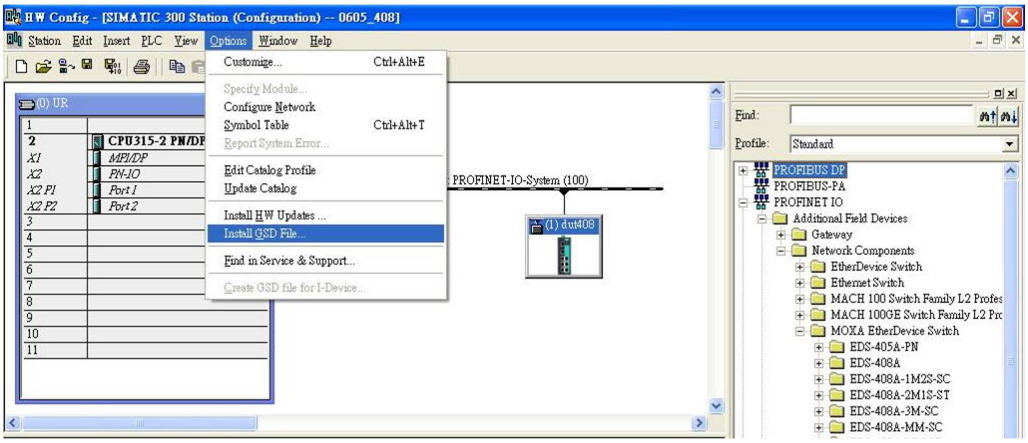
# GSD File Installation

1. Open SIMATIC manager on your PC.
2. Open your project.

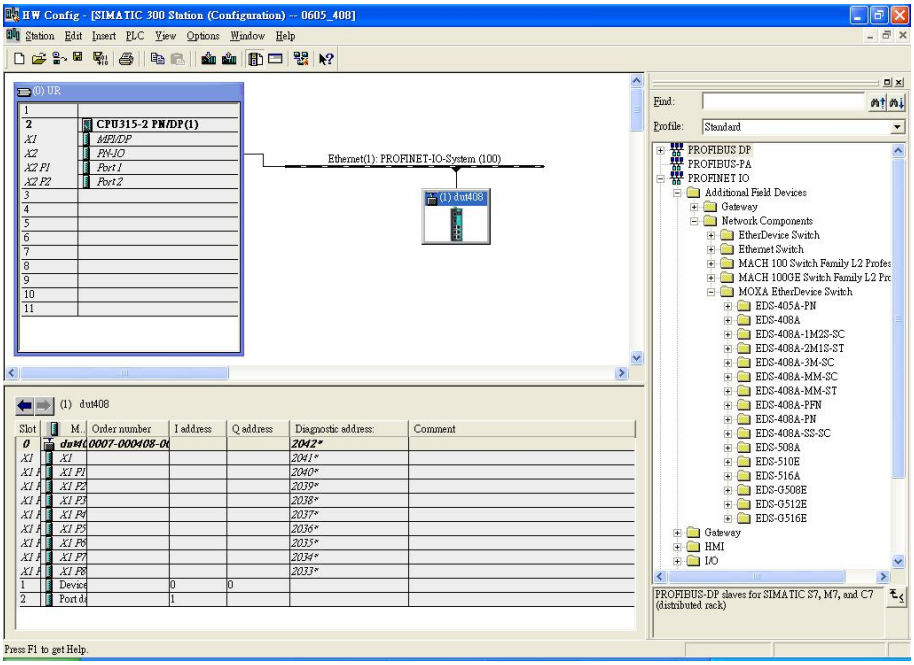
3. Open hardware configuration.




4. Install the GSD file:
   Put the GSD file and icon file on your PC at the same folder
   Select "Install GSD File" and install the GSD file just saved.




5. You will find the new MOXA switch under PROFINET IO > Additional Field Devices > Network Components > MOXA EtherDevice Switch.
6. Use Drag & Drop to pull the MOXA switch onto the bus cable. And you can see the MOXA switch icon displayed on the screen

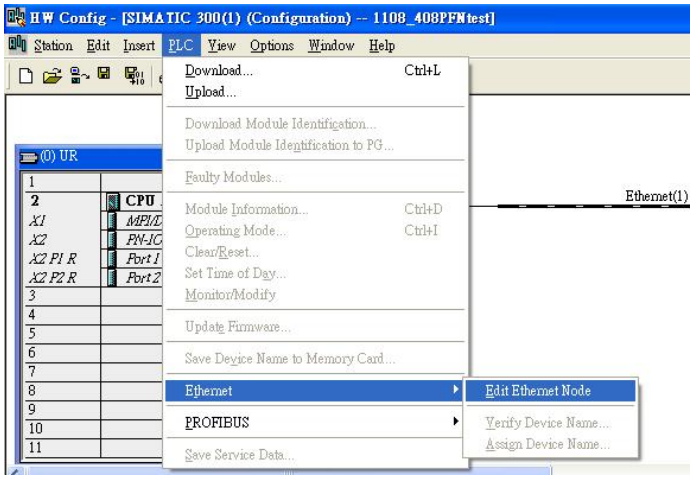



- Product Icons
  Ex. File Name: EDS-405A.bmp, EDS-408A.bmp, EDS-510E.bmp, EDS-G508E.bmp, EDS-G512E-4GSFP.bmp, EDS-G516E-4GSFP.bmp

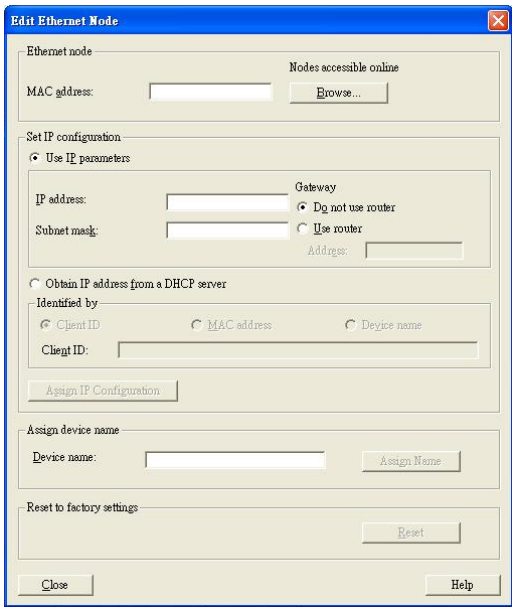
# Device Configuration

1. Browse the switch

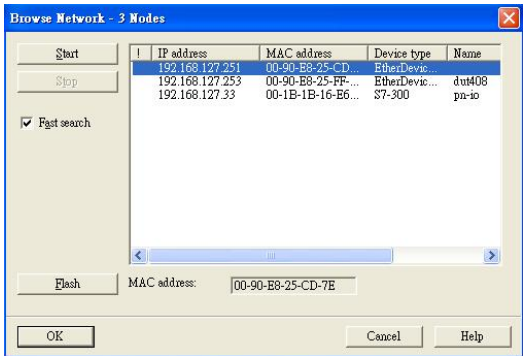
   Select **PLC** > **Ethernet** > **Edit Ethernet Node** to open the Browse dialog.




   After the **Edit Ethernet Node** dialog box appears, click **Browse**




   Select your target switch and click **OK**




2. Assign IP address and Device name

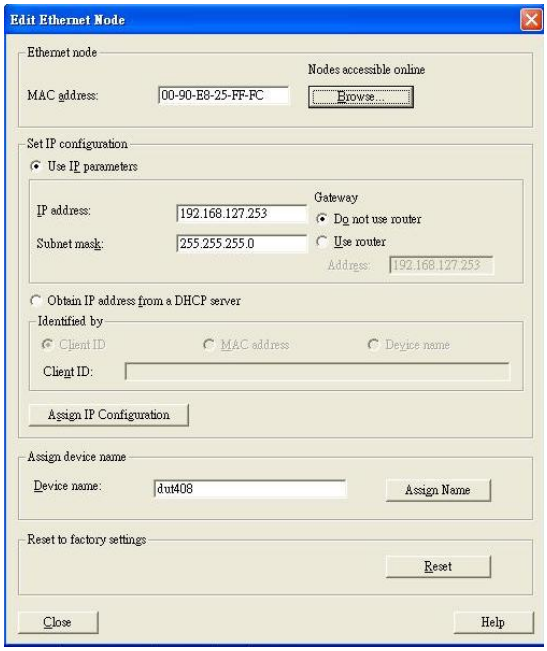
   a. Give the switch an IP address and subnet mask

   Click **Assign IP configuration**

   b. Give the switch a name

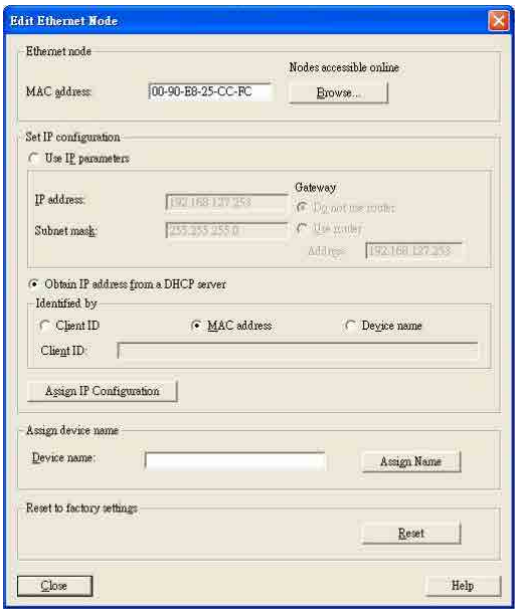
   Click **Assign Name**

c. Click **Close** to finish



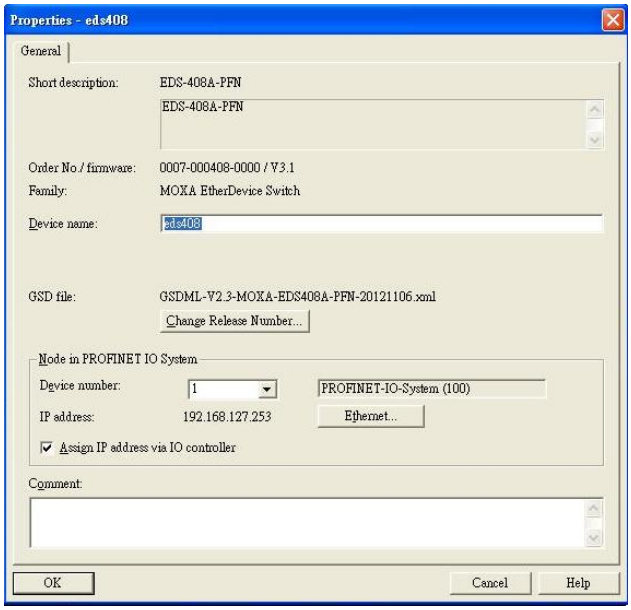

| **NOTE** | The field **Device name** does not allow any empty spaces in the name. If the device name is entered with a space, the system will remove words after the space automatically. |
|---|---|

3. Set IP address and device for your project
   a. Double-click the switch icon to open switch property menu.
   b. Set the **Device name** and **IP address** corresponding with those you have just assigned in STEP 7.
      - **Use IP parameters**
        Manual input of **IP address** and **Subnet mask**
      - **Obtain IP address from a DHCP server**
        Select **MAC address** then click **Assign IP configuration**



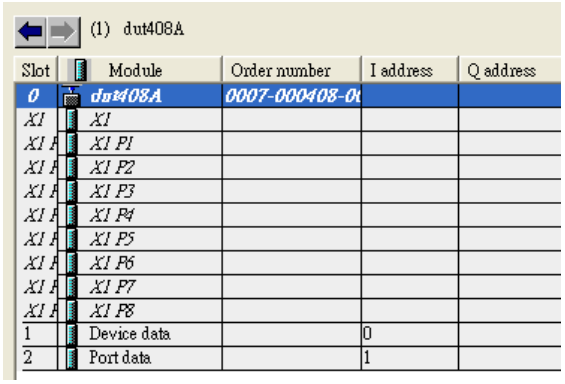

After the IP has been assigned by DHCP, click **Browse** again to check the assigned IP address.

c. Click **Save and Compile** then click **download to Module.**



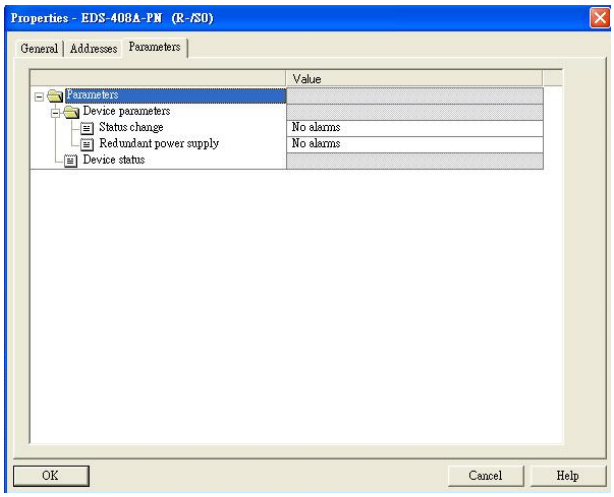

4. Configuring device properties

a. Select the switch and double-click the first **sub-module slot 0** to set device properties.




b. Select **Parameters** and change the device parameter settings.

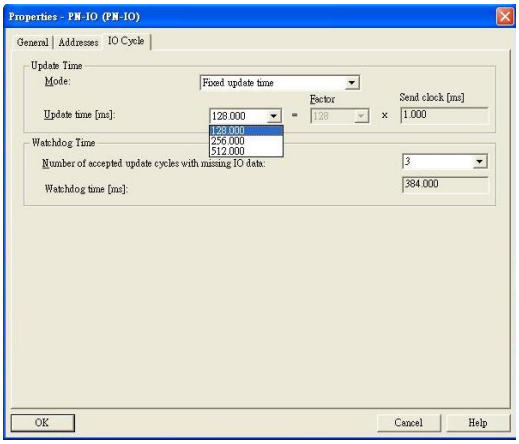
c. Click **Save and Compile**, then click **download to Module**



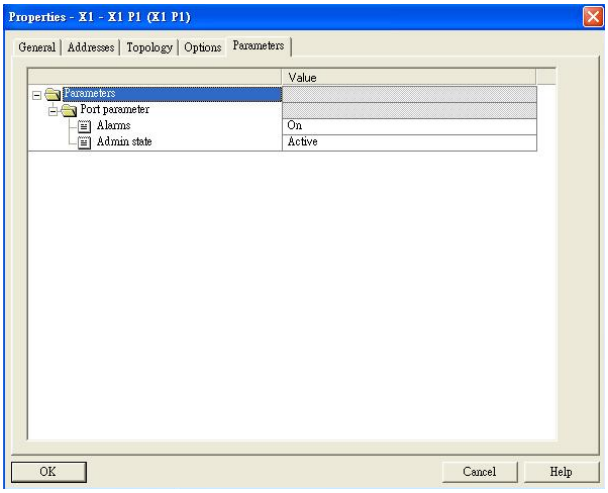

5. Configuring I/O cycle

a. Select the switch and double-click the **sub-module X1** to set the I/O cycle.

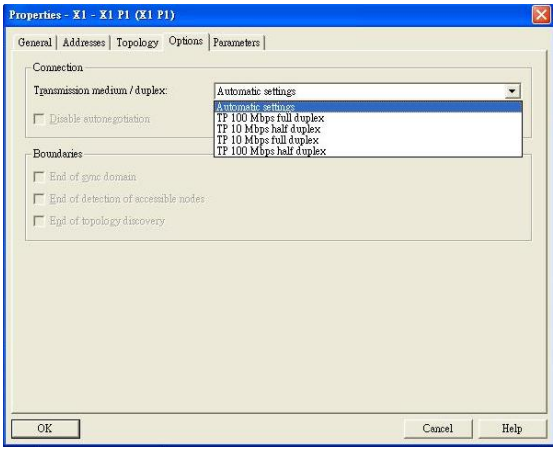
b. Select **IO Cycle** and change the I/O cycle settings. Click **Save and Compile**, then click **download to Module**.




6. Configuring port property
    a. Select the switch and double-click the **sub-module X1 P*N*** to set port property.
    b. Select **Parameters**.
    c. Change the port parameters settings.
    d. Click **Save and Compile** then click **download to Module**.

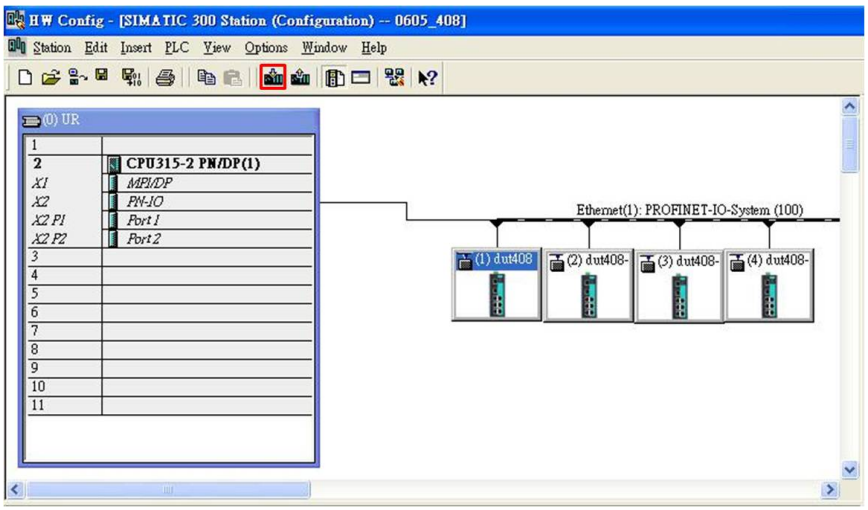



7. Configuring connection options
    a. Select the switch and double-click the **sub-module X1 P*N*** to set port options.
    b. Select **Options**.
    c. Change the port option settings.
    d. Click **Save and Compile,** then click **download to Module**



# Save and Load the Project into the PLC

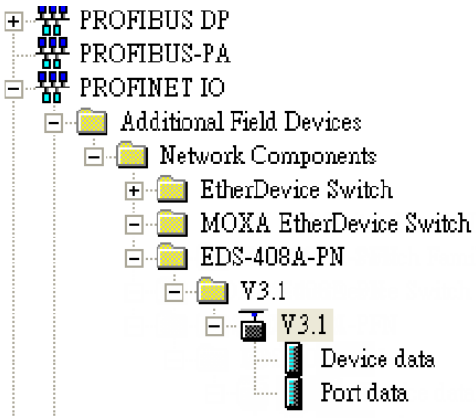
Click the icon (in red box) to download project configuration to the PLC.
After the project is configured, SIMATIC STEP 7 will load all information required for data exchange to the I/O Controller (PLC), including the IP addresses of the connected I/O devices.



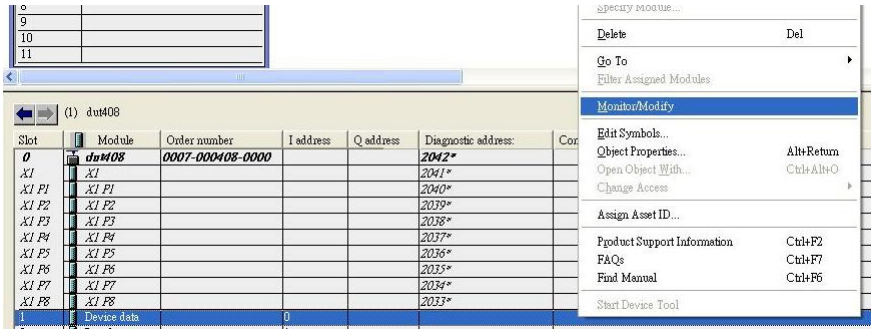

# Monitoring the Switch

## Monitor PROFINET I/O Cyclic Data

MOXA switches provide PROFINET I/O cyclic data for real-time monitoring. In side bar you can see **Device data** and **Port data.**



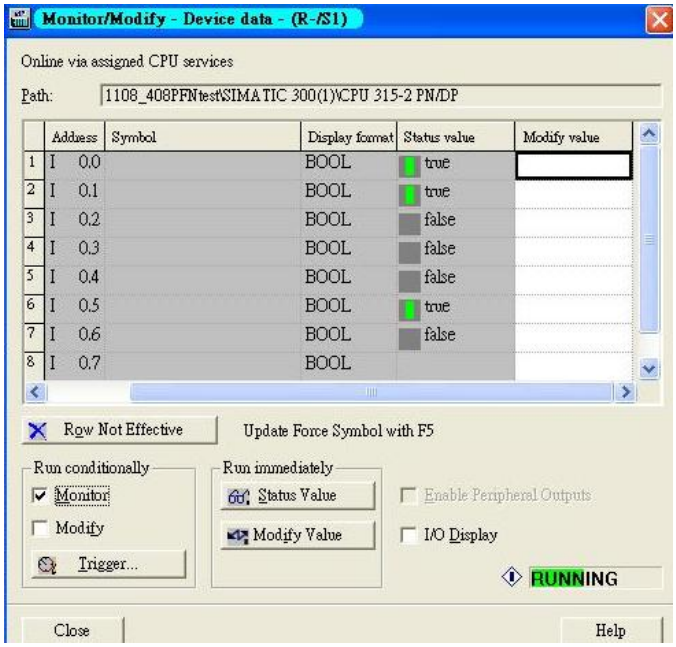

Use Drag & Drop to pull the **Device data** onto **slot 1**. Right-click on slot 1, then select **Monitor/Modify**.



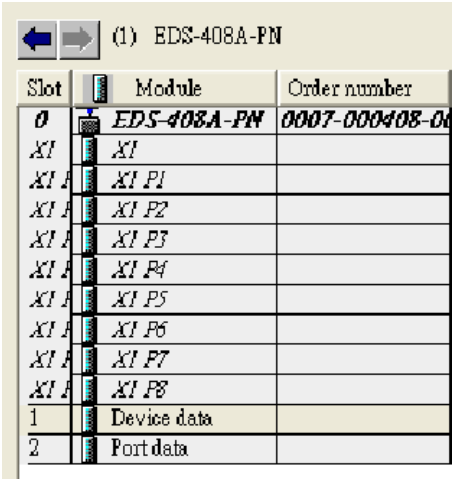

Use Monitor to check the input data value. In this dialog, you can see the status value of each address. Please refer to the **PROFINET Cyclic I/O data table** in Chapter 5.1 to see the meaning of each bit. For

example, address 0.1 is Bit 1 in the **PROFINET Cyclic I/O data table.** It represents Power 1 status of the switch. 1 means Power 1 exists and **Green** will be displayed in the **Modify/monitor** window

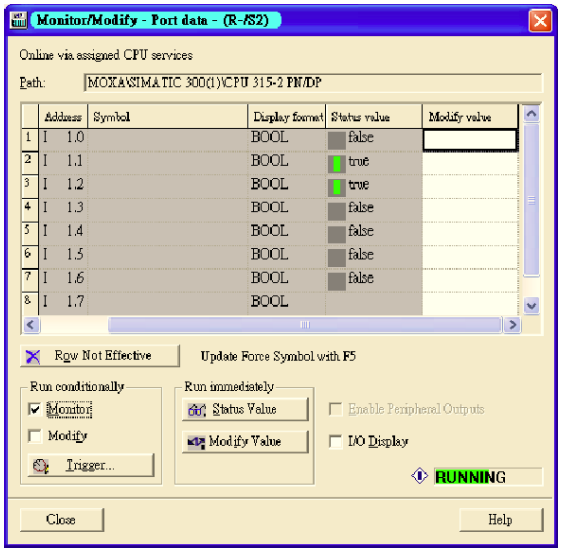
NOTE: Refer to the **PROFINET Cyclic I/O data table** in chapter 5.1 for the meanings of each address.




To monitor Port data, follow the same steps, drag **Port data** in the side bar and drop it onto **slot 2**. MOXA PROFINET I/O cyclic data in the slot 1 and 2



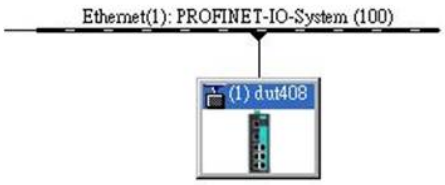

Then right click. Select **Monitor/Modify.** You will see a monitoring window.



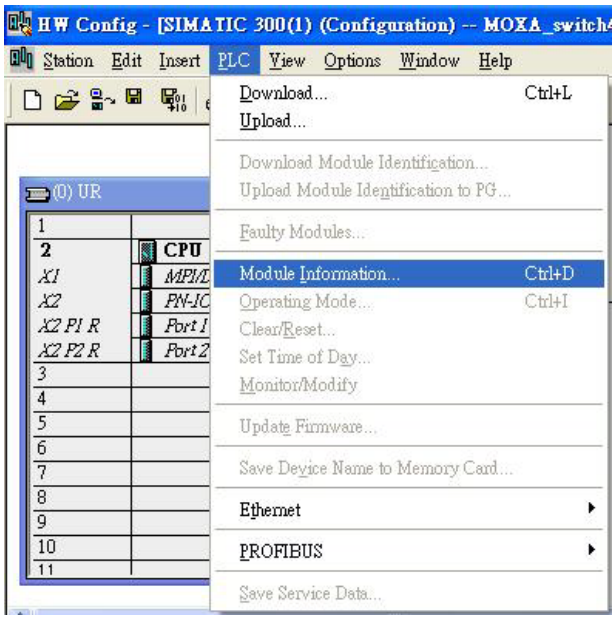
## Module Information

MOXA switch supports SIMATIC STEP 7 Ethernet traffic information monitoring and PROFINET alarms. These attributes can be monitored in module information dialog. Following are the steps of operation.

Select MOXA switch icon on the screen.



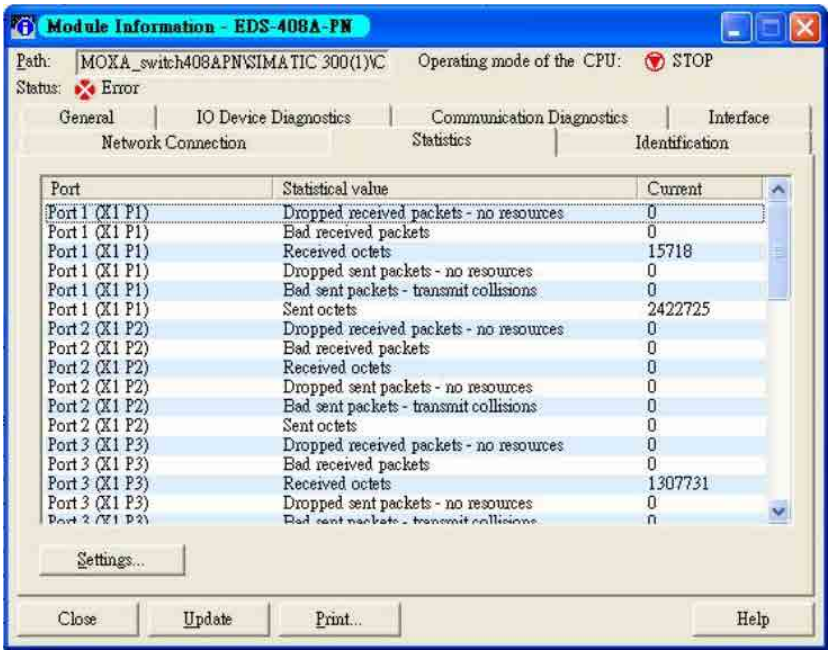

Then, click menu bar **PLC** > **Module Information**




The module information dialog will then pop up.

## Port Statistics Output

Select **Statics** tags. Find out each port traffic information list below.

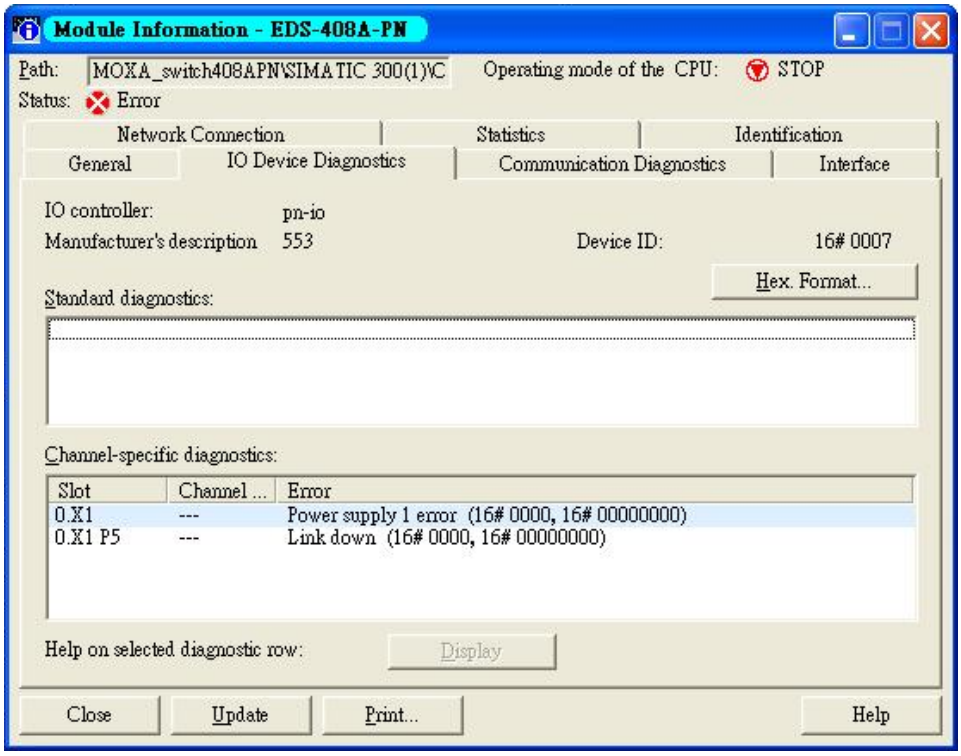

Module Information - EDS-408A-PN
Path: MOXA_switch408APN\SIMATIC 300(1)\C
Operating mode of the CPU: STOP
Status: Error
General
IO Device Diagnostics
Communication Diagnostics
Interface
Network Connection
Statistics
Identification
Port
Statistical value
Current
Port 1 (X1 P1) Dropped received packets - no resources 0
Port 1 (X1 P1) Bad received packets 0
Port 1 (X1 P1) Received octets 15718
Port 1 (X1 P1) Dropped sent packets - no resources 0
Port 1 (X1 P1) Bad sent packets - transmit collisions 0
Port 1 (X1 P1) Sent octets 2422725
Port 2 (X1 P2) Dropped received packets - no resources 0
Port 2 (X1 P2) Bad received packets 0
Port 2 (X1 P2) Received octets 0
Port 2 (X1 P2) Dropped sent packets - no resources 0
Port 2 (X1 P2) Bad sent packets - transmit collisions 0
Port 2 (X1 P2) Sent octets 0
Port 3 (X1 P3) Dropped received packets - no resources 0
Port 3 (X1 P3) Bad received packets 0
Port 3 (X1 P3) Received octets 1307731
Port 3 (X1 P3) Dropped sent packets - no resources 0
Settings...
Close
Update
Print...
Help

Statistics tab lists each port traffic status and the number of packets. Click **Update** to refresh the data.

## I/O Device Diagnostics

Moxa PROFINET switches support PROFINET alarms. These alarm messages will be sent by the switch immediately when an event is triggered. These alarms can be enabled/disabled using PROFINET I/O parameters(see chapter **PROFINET I/O Parameters** ).

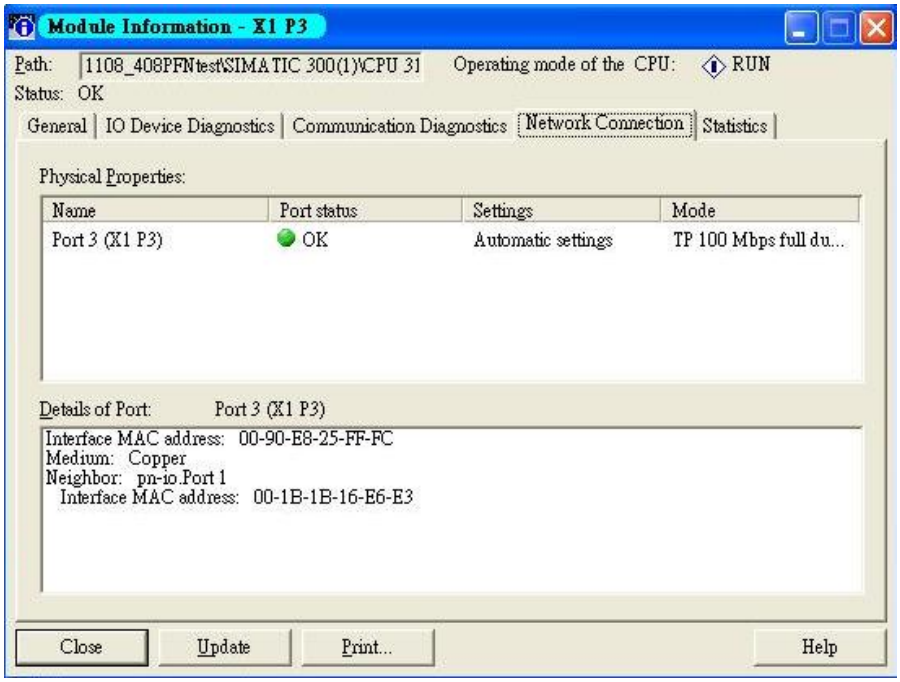
Select **IO Device Diagnostics** tab to view alarms received by the PLC.




The **Channel-specific diagnostics** field is displaying link-down alarm information. Click **Update** to refresh the data.

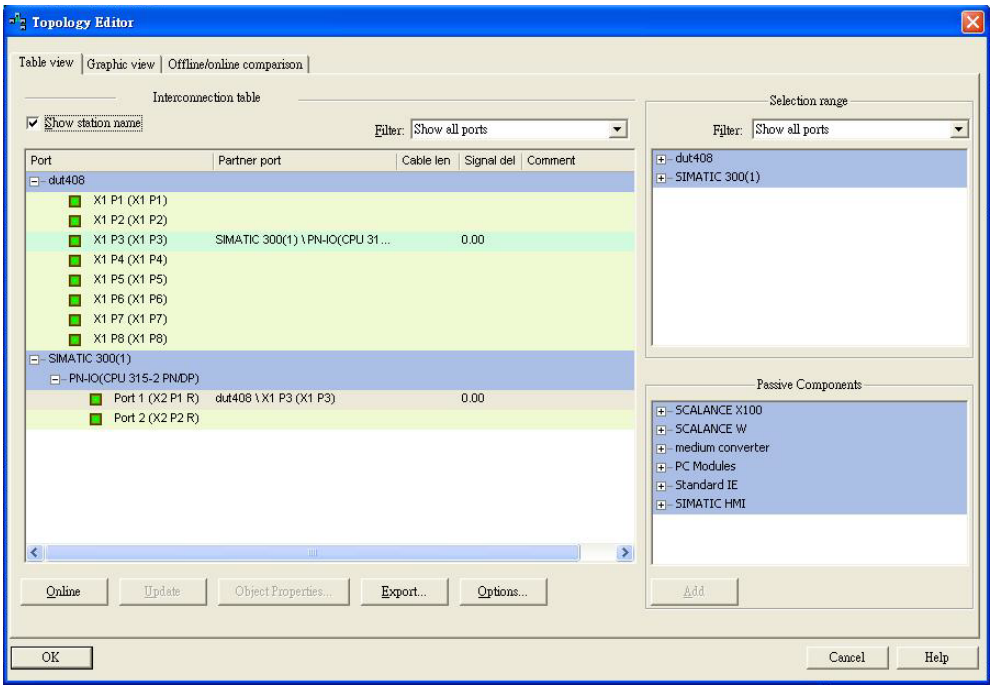
## Communication Diagnosis

Select a sub-module and use “PLC: Module Information” to see the diagnostic data.

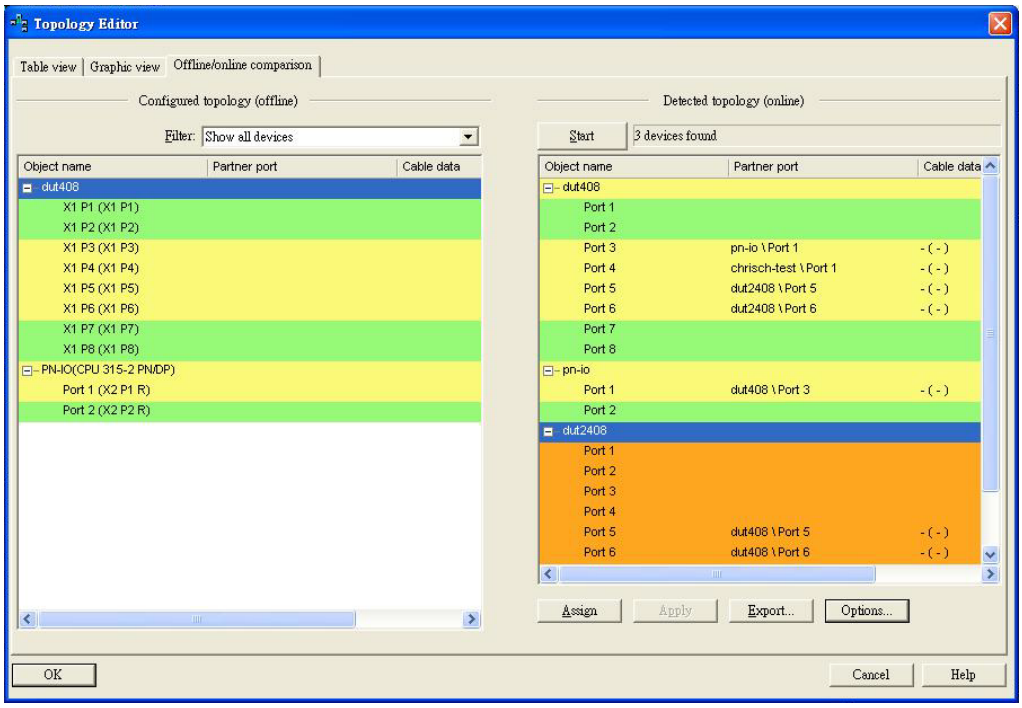



## Topology Editor

MOXA devices support SIMATIC STEP 7 Topology editor. Click Topology Editor. View each port's connection status in table view tag.




In the **Offline/Online Comparison** tab, you can compare device partner ports. Click S**tart** to discover connection relationships.




You can also draw the connection of each port manually in **Graphic view** tab.